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Published Monthly By
THE INDUSTRIAL PRESS
148 Lafayette St., New York 13, N. Y.

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DON HARWAY & COMPANY
1709 W. Eighth St., Los Angeles 14, Calif.
57 Post St., San Francisco 4, Calif.

Subscription Rates: United States and Canada, one year, $4; two years, $7; three years, $8; foreign countries, $7 a year. Single copies, 40 cents. Changes in address must be received by the fifteenth of the month to be effective for the next issue. Send old as well as new address. Entered as second-class mail matter, September, 1894, at the Post Office, New York, N. Y., under the Act of March 3, 1879. Printed in the United States of America.

British Address:
National House, West St.
Brighton 1, England

Total Distribution
for April, 23,157

MACHINERY

VOLUME 55 MAY, 1949 NUMBER 9

The Monthly Magazine of Engineering and Production in the Manufacture of Metal Products

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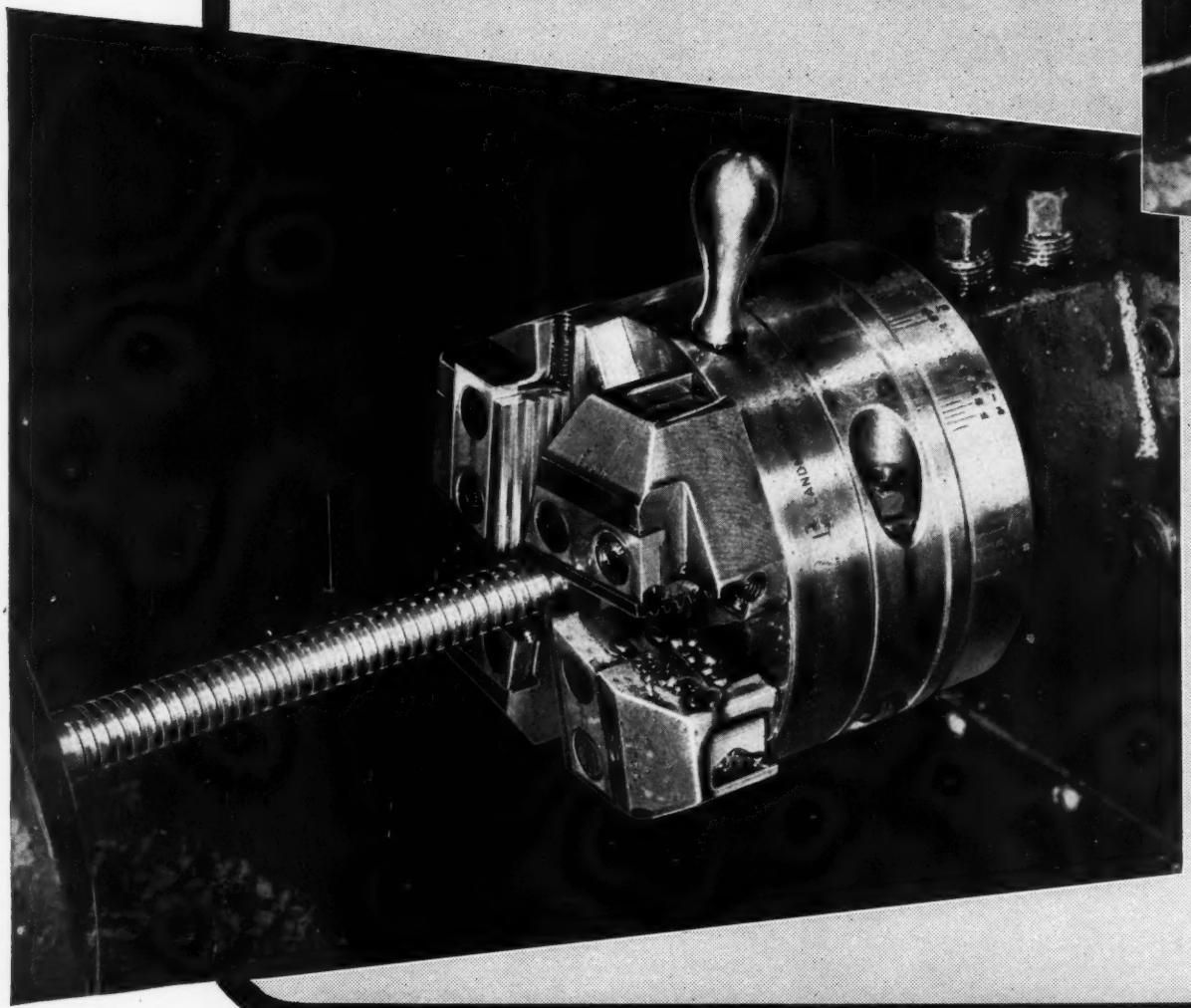
400% SAVING WITH *Landmatic* HEADS

- Cut thread in only one pass.
- No hand fitting in assembly.



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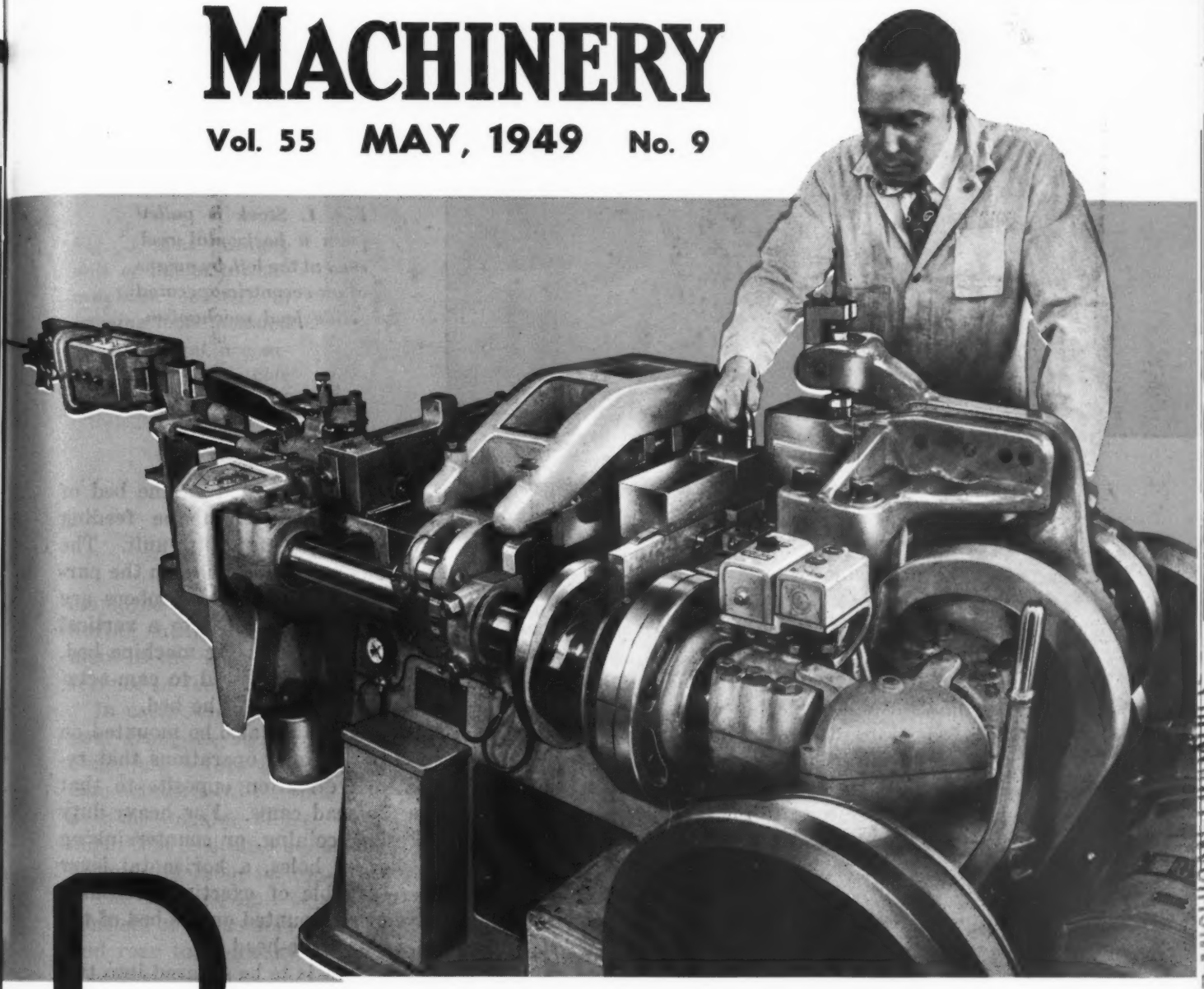

Designing Tools for Multi-Slide Machines

By P. E. McKEITH
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Ampere (East Orange), N. J.

PRACTICALLY an unlimited variety of intricate parts can be produced automatically within close tolerances and at high production rates on the multi-slide type of machine. Stampings previously requiring operations on as many as ten separate presses, each with its own operator, are now completely finished on one multi-slide machine.

Modern multi-slide machines combine horizontal presses, generally equipped with progressive dies, and a four-slide forming unit. Piercing, blanking, trimming, swaging, embossing, cutting off, and various forming operations can be performed simultaneously or in any desired sequence to produce a completely formed part, or several parts, at each stroke of the machine.

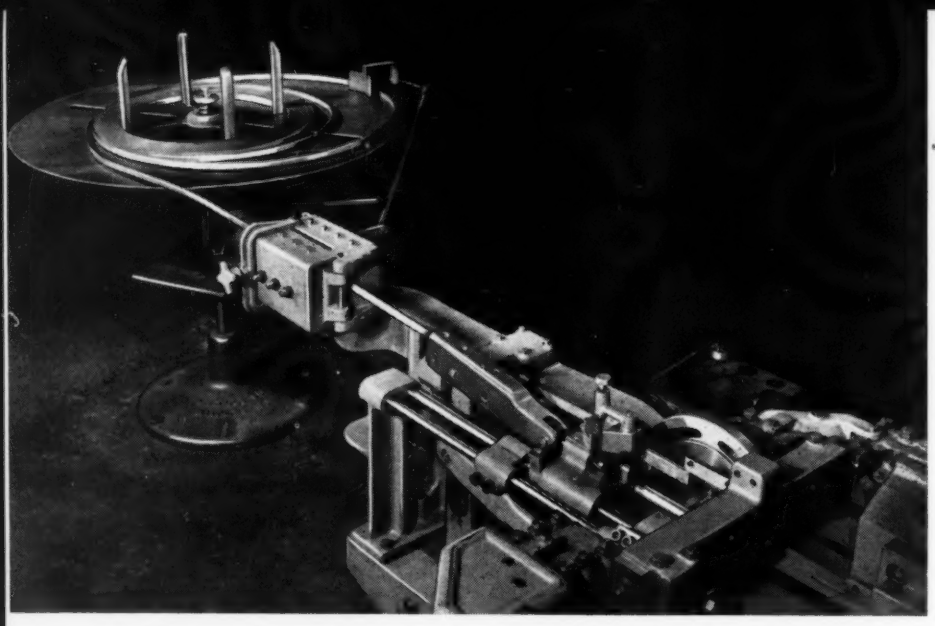


Fig. 1. Stock is pulled from a horizontal reel, seen at the left, by means of an eccentric-operated slide feed mechanism

While the ribbon stock is maintained in a vertical plane, it is fed in a horizontal direction through the multi-slide machine from a coil. A horizontal reel is provided at the left-hand end of the machine (Fig. 1) to hold the coil of material. The reel is periodically actuated by means of a mercury switch, and maintains constantly a loose loop of material between the reel and the feeding mechanism of the machine.

Stock is fed from the loose loop through straightening rolls by means of an eccentric-operated slide feed mechanism, as shown in Fig. 2. An automatic accurate feed is obtained by the eccentric-actuated motion of a feed-block, containing a gripping blade, which is confined to an exact advance between two adjustable positive stops. A cam-actuated stock check unit prevents movement of the stock during the working cycle, as well as during the return stroke of the feed-block.

From one to three cam-actuated horizontal die-heads, Fig. 2, can be located on the bed of the multi-slide machine between the feeding mechanism and the slide forming unit. The number of die-heads used depends upon the particular part being produced. Die members are generally stationary, being bolted to a vertical bolster or plate at the rear of the machine bed, while punch members are secured to cam-actuated ram slides at the front of the bed.

A rear auxiliary slide can also be mounted on the machine for performing operations that require pressure in a direction opposite to that exerted by the die-head cams. For heavy-duty swaging, embossing, coining, or countersinking of previously pierced holes, a horizontal lever or toggle press, capable of exerting pressures up to 100 tons, can be mounted on the bed of the machine in place of a die-head.

When the strip stock is to be sheared into two or more narrower widths for multiple-part production, a rear positive knock-out attachment is

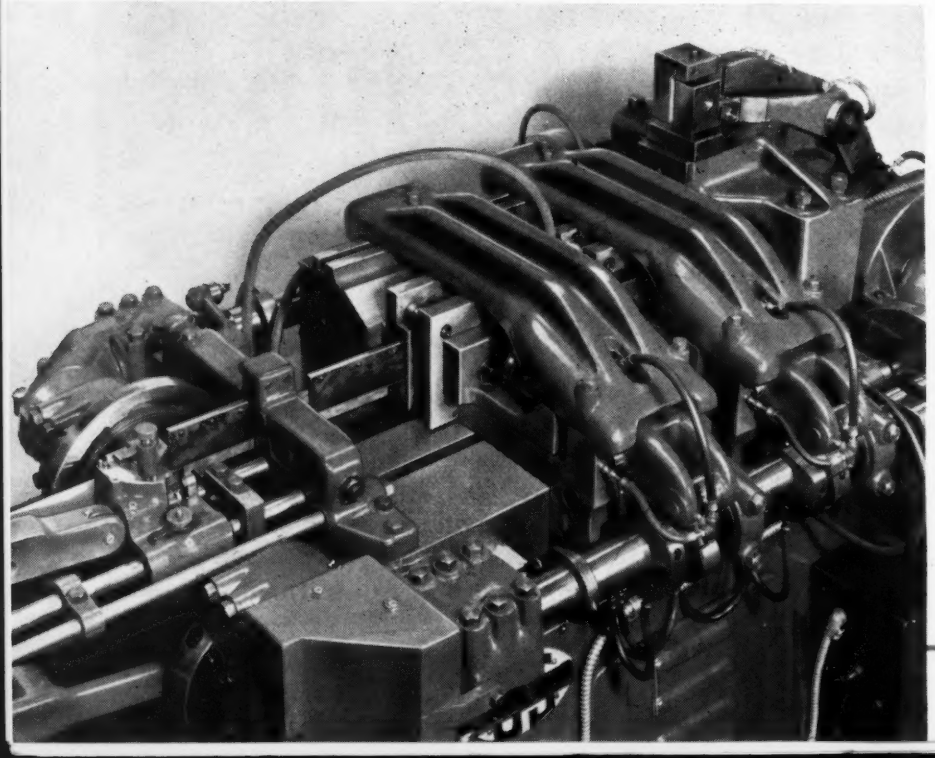


Fig. 2. Ribbon stock, maintained in a vertical plane, is fed between cam-actuated horizontal die-heads

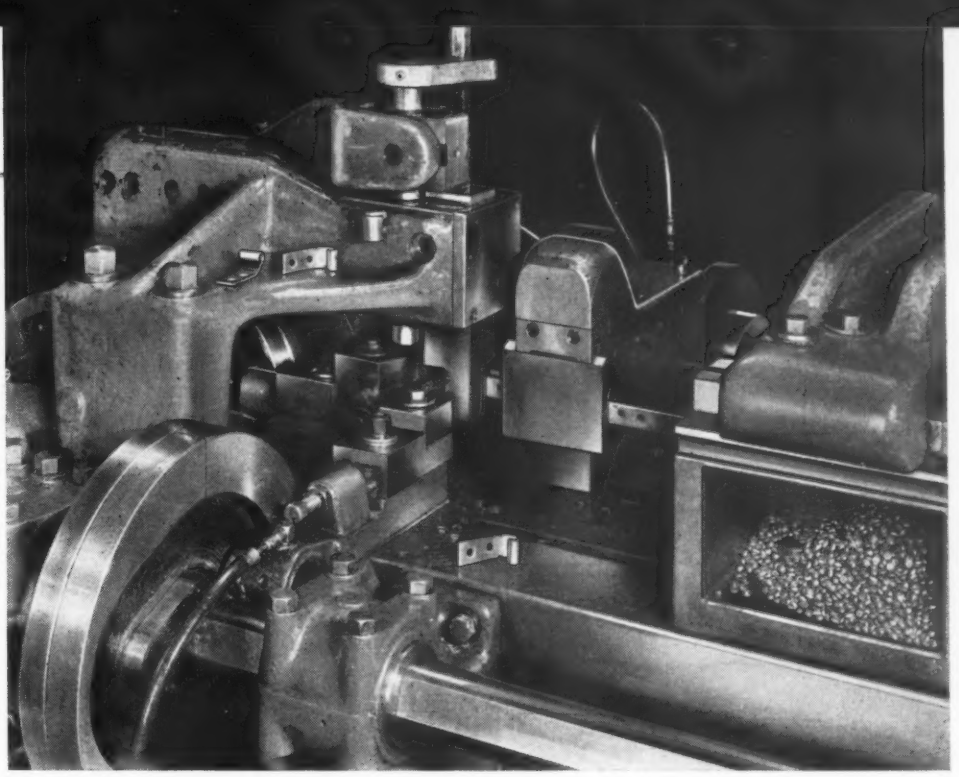


Fig. 3. The forming unit of the multi-slide machine consists of forming tools mounted on slides that are actuated by adjustable cams

employed to provide a preloaded spring action during shearing. This attachment assures alignment of the sheared strips and eliminates interference in feeding.

In cases where it is not advisable to cut the part from the strip in a die-head, this can be done just before final forming by mounting a cam-actuated cut-off slide between the die-heads and the forming slides. When the part is cut off in this position, the blank is picked up by the forming tools the instant it is cut from the strip.

The forming unit of the multi-slide machine consists of adjustable left- and right-hand front and rear tools mounted on cam-actuated reciprocating slides, as shown in Fig. 3. Adjustable split cams are employed to actuate the slides. Multiple action of the forming slides can be obtained by providing several lobes on the slide-actuating cams. The use of split cams facilitates set-up and adjustment, and the shaft system of the machine need not be disturbed.

A cam-operated vertical stripper movement is provided with the machine. When forming around a post is required, this movement can be utilized to strip the finished part from the post. In cases where it is necessary to form the part on more than one level, the same mechanism can be employed to progressively lower the part on the vertical post to each forming level and finally strip the finished part from the post. In some instances, the vertical movement is used to perform a downward forming operation.

The machine is usually arranged with an electrically operated brake which is controlled by two

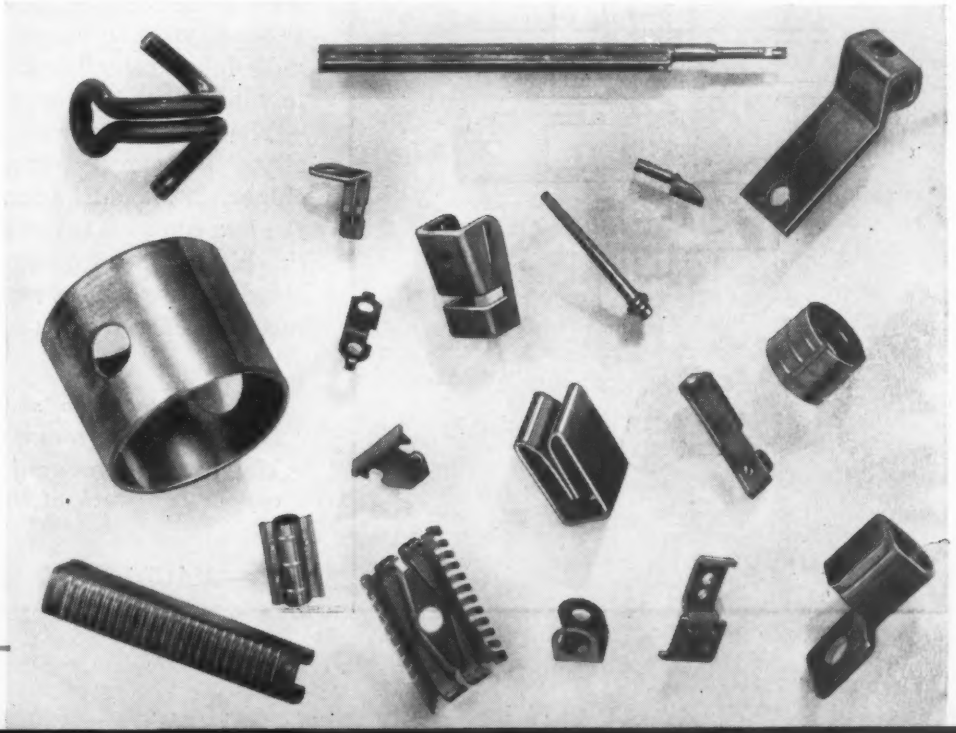
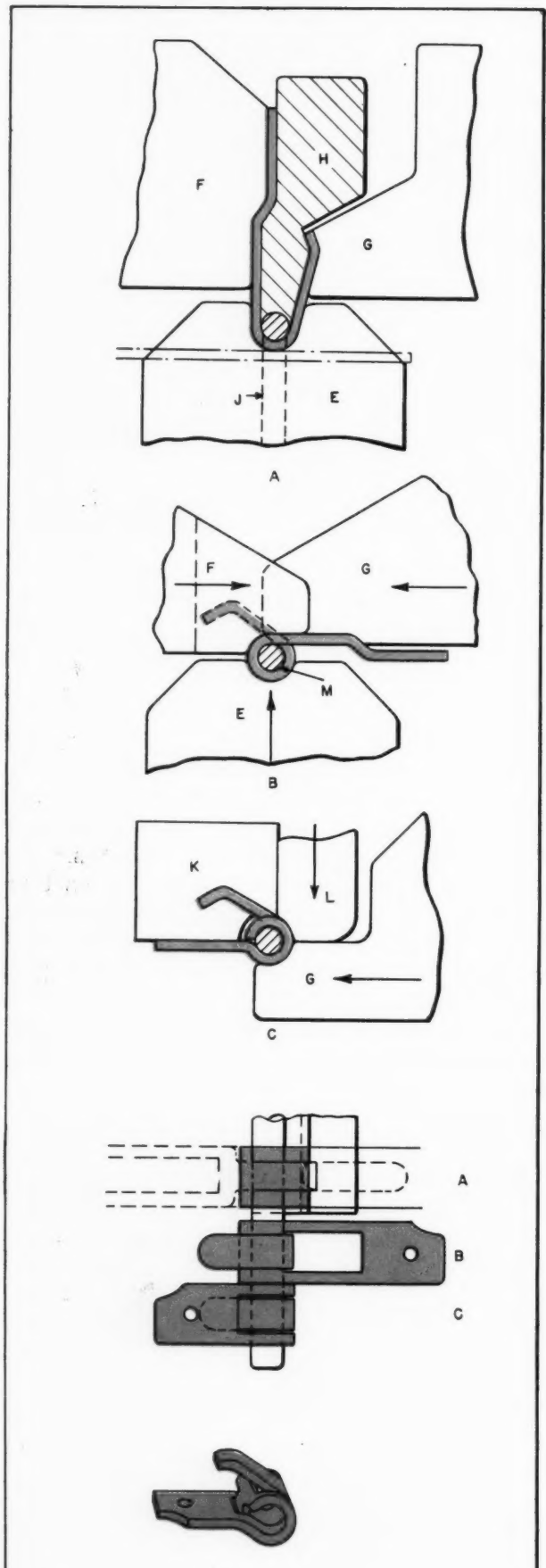


Fig. 4. Examples of the large variety of complex-shaped parts that can be formed on multi-slide machines



micro-switches. The end of the strip of material entering the forming position contacts one micro-switch, which is located under the stripper head of the machine. At the same instant, a cam on the rear shaft actuates the second micro-switch, which is synchronized with the one under the stripper head.

If the strip fails to contact the safety switch, the clutch will be disengaged, the brake applied, and the machine stopped practically instantaneously. This serves to prevent damage to the tools or machine if, for any reason, the proper pitch or feed length is not obtained.

Practically any material can be formed on the multi-slide machine. Annealed or soft grades of material are, however, easier to form, and they produce less wear on the tools and dies. Even when subsequent heat-treatment is necessary, it is generally more economical to form soft than to attempt using material of harder temper. When forming is not severe and sections of the part are relatively thin, tempered materials can be formed satisfactorily. In cases where hard materials are formed, the capacity rating of the machine should be lowered accordingly.

In forming such materials as phosphor-bronze, stainless steel, and other high-temper metals, springback is often encountered after the part has been formed. The amount of springback cannot be accurately determined, and this condition can only be compensated for by changing the shape of the form tools during their development or while they are being set up on the machine.

Plated materials can be formed, but it is usually better to plate after forming. Coatings thicker than about 0.0005 inch generally increase the cost of forming. A cadmium coating is sometimes applied to beryllium-copper strip stock as a die lubricant. The cadmium can be burned off in subsequent heat-treatment.

There are few limitations on the intricacy of shape that can be formed on the mutli-slide machine. It should be remembered, however, that the less complex the part, the lower the cost and the higher the production. Samples of complicated parts should first be made by hand to determine their practicability.

Fig. 5. Successive steps in three-level forming of stamping shown at bottom of illustration. The part is produced from 0.095 inch thick copper coil stock at the rate of 90 per minute

The size and cross-sectional area of the stamping to be produced should be kept at a minimum, consistent with good design. Radii of the bends to be produced in the part depend upon the type of part, material, and direction of grain. Standard die practice is followed in this respect. Sharp bends in other than annealed materials will often result in cracking due to the localized stresses set up. Dead soft metal can often be bent back upon itself, through an angle of 180 degrees, without danger of cracking.

A symmetrical part is the most desirable from the standpoint of forming. Sudden changes in cross-section or closely spaced holes or slots should be avoided wherever possible, to minimize stress concentrations, tool wear, and warpage if the part is to be subsequently heat-treated.

Multi-slide forming is generally employed to produce large quantities of complex-shaped parts, such as those shown in Fig. 4. However, since the tools and cams are easily adjusted or changed, this method can often be used economically for small runs, such as, say, 25,000 pieces.

Materials in widths up to 3 inches and in thicknesses up to 3/32 inch can be handled on the larger size multi-slide machine. Maximum length of stock which can be fed per stroke varies from 3 to 12 1/2 inches, depending upon the size of the machine. The stroke of the die ram varies from 3/8 inch on the smallest machine to 3/4 inch on the largest, and the throw of the forming cams from 7/8 inch to 2 inches.

A variable-speed drive permits changing the speed from 150 to 500 R.P.M. on the small machine, and from 40 to 160 R.P.M. on the larger. However, a maximum feed rate of 100 surface feet per minute is recommended.

Parts produced on multi-slide machines can, in general, be held to closer tolerances than work produced on conventional power presses. The tolerances that can be maintained, however, are adversely affected by edgewise camber in the coil stock, non-uniformity in quality, and variation in thickness from commercial limits.

Length of feed can be held uniform within $\pm$ 0.001 inch. The inside diameter of formed rings can be maintained within $\pm$ 0.0005 inch.

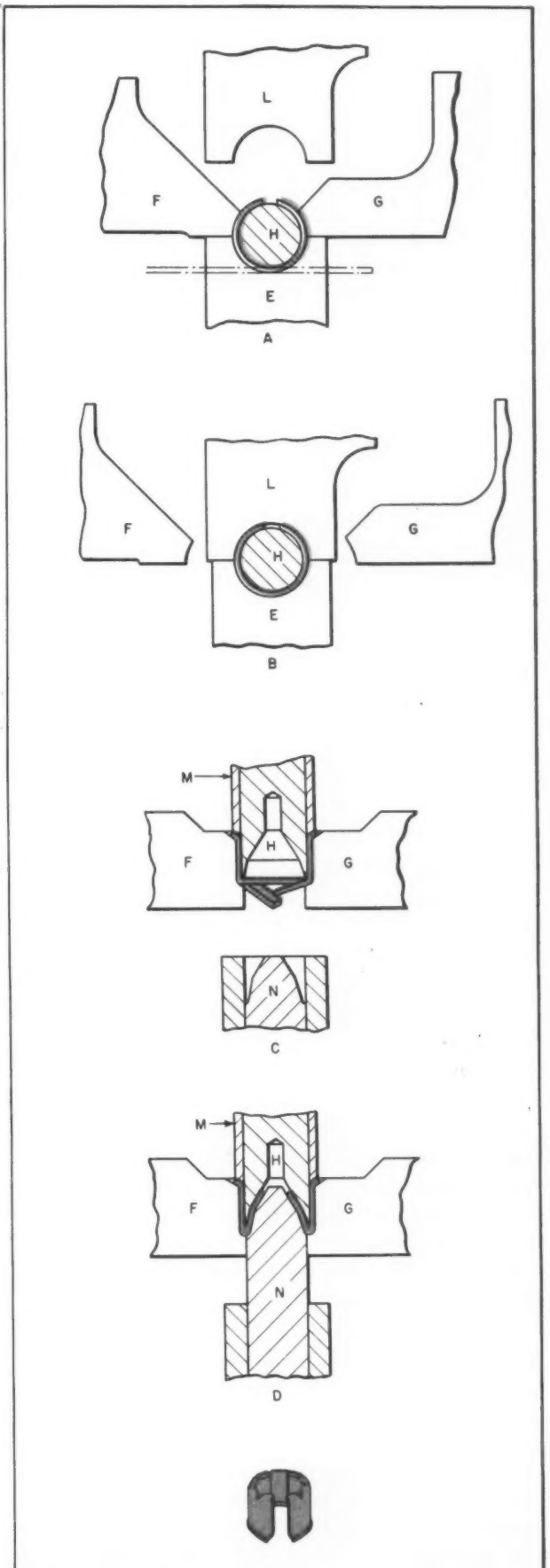


Fig. 6. Successive steps in the production of electrical connectors by single-level forming on a multi-slide machine. These parts are formed at the rate of 125 per minute

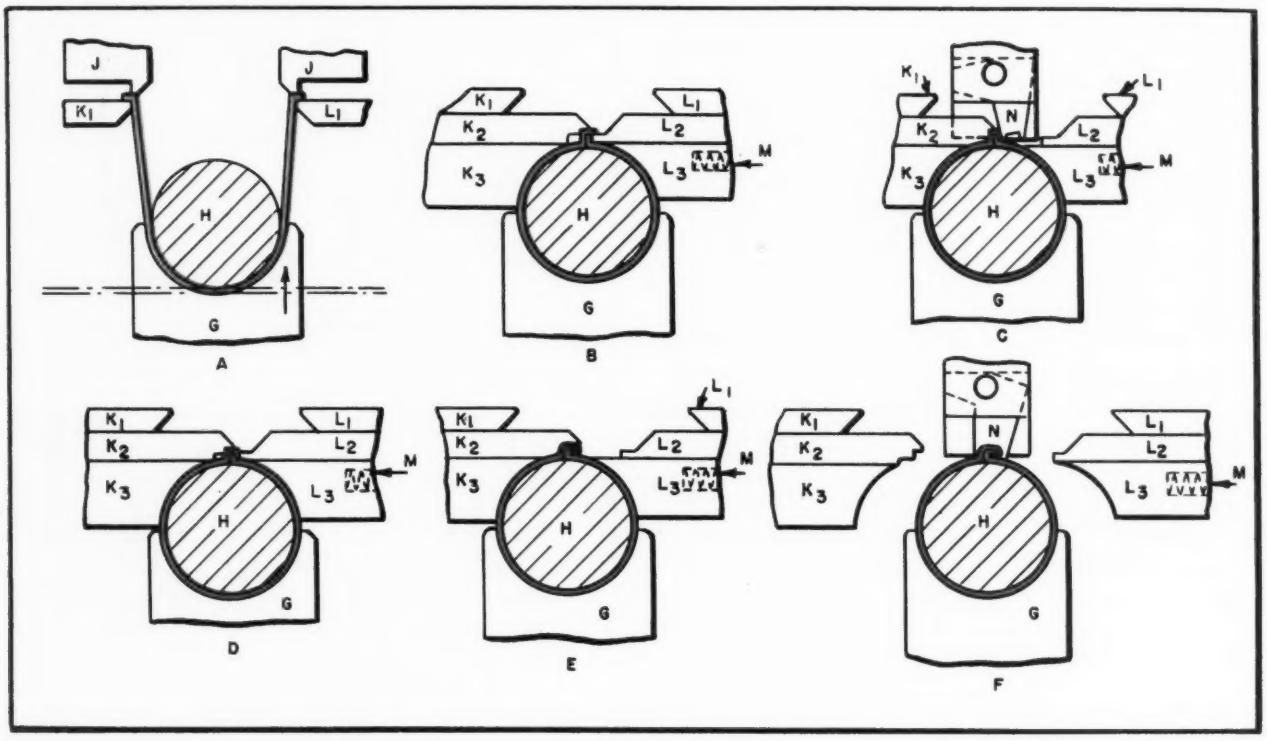


Fig. 7. Successive operations performed in making a lap-seam ring, 4 inches in diameter by 5/8 inch wide, from cold-rolled steel strip at the rate of 75 per minute

A tolerance of ± 0.002 inch, however is more economical for high production. Formed dimensions can generally be maintained within ± 0.001 to ± 0.005 inch, and angular tolerances from ± 1/2 to ± 1 degree.

Die sets for the horizontal-acting die-heads employed on multi-slide machines are of special design, but are somewhat similar to those employed on vertical punch presses. Dies are generally made of sectional construction to provide longer life, facilitate repair or resharpening, and permit making changes required by modifications in the design of the product without scrapping the entire die.

Slugs or blanks are pushed out through an opening in the die and rear angle-plate and down a chute, or blown into a chute by a blast of air if sufficient space is available. The air blast can be controlled by a cam-operated valve.

For cutting or slitting operations, a spring- or cam-actuated pressure pad of the same shape as the cutting punch is provided to eject the cut part from the die, so the stock can be fed again.

Simple forming tools are made in one piece and mounted on a tool-block. When wear is excessive, however, inserts are employed to minimize forming tool replacement costs. Supports can be added to strengthen the forming tools when required. Rigid mounting of the tools is necessary to prevent springback.

High-carbon, high-chromium steels are generally used for making the die inserts, punches, and forming tools. Such parts are heat-treated and annealed to a Rockwell hardness of from 60 to 62 C. Die-blocks for holding the inserts and punches are made from an oil-hardening tool steel which is not heat-treated.

The form posts about which the part is bent are generally made from the same material as the forming tools—high-carbon, high-chromium steel. However, if the design of the part to be formed requires a thin cross-section post that is subject to continuous flexing, the post is made from an oil-hardening tool steel having high fatigue resistance.

For the high-production forming of materials such as stainless steel, carbide is sometimes employed for the die inserts, punches, and forming tools to extend the tool life and prevent the material from being "picked up" by the tool.

Examples of Typical Forming Operations on Multi-Slide Machines

An example of three-level forming is illustrated in Fig. 5. The stamping shown at the bottom, is produced from copper coil stock, 0.095 inch thick, by 5/8 inch wide, at the rate of 90 per minute. The operations are as follows:

(1) The blank is pierced, trimmed, and cut off in the die-head. (2) Preliminary forming is accomplished at the top level *A* by front tool *E*, left-hand tool *F*, and right-hand tool *G*, which wrap the blank about form post *H*. Front tool *E* is equipped with a pressure pin *J* for picking up the blank the moment it is cut off. (3) Intermediate forming is done at the second level *B* by overlapping tools *F* and *G*, which form the part around pin *M*. (4) At the bottom level *C*, the part is finish-formed by rear tool *L*, right-hand tool *G*, and stationary guide *K*.

The electrical connector shown in Fig. 6 is produced at the rate of 125 per minute. The operations are accomplished in a single-level forming position as follows:

(1) The preliminary forming is done with left-hand tool *F*, right-hand tool *G*, and front tool *E*, the blank being wrapped around form post *H*. (2) Left-hand tool *F* and right-hand tool *G* are then retracted, and rear tool *L* is advanced, as shown at *B*. (3) The next step in the forming operation is accomplished, as shown in the side view at *C*, by the use of stationary post *H*, upper form tool *M* (on the stripper) and lower form tool *N*. (4) Final forming is effected, as shown at *D*, with the lower form tool *N* elevated to bend in the central lugs of the stamping. Tool *N* is actuated by an auxiliary movement which is cam-controlled from the shaft of the machine. The upper tool *M* is also used to strip the finished part from the post *H*.

A lap-seam ring 4 inches in diameter by 5/8 inch wide is formed at the rate of 75 per minute with the ingenious two-level tooling shown in Fig. 7. Cold-rolled steel strip stock 0.030 inch thick is employed. The sequence of operations is as follows:

(1) At the upper level, shown at *A*, front tool *G* bends the flat blank around a stationary form post *H* until the ends of the blank contact stationary rear brackets *J*. One section of both right- and left-hand tools L_1 and K_1, respectively, are advanced to bend the ends of the blank as indicated. (2) The blank is then lowered on form post *H* to the lower level, shown at *B*. Here two other sections K_2 and K_3 of the left-hand tool and two additional sections L_2 and L_3 of the right-hand tool are simultaneously advanced to form the blank completely around the post and also bend the ends of the blank as shown. (3) The L_2 section of the right-hand tool is then retracted, as shown at *C*, by means of the right-hand cam, while section L_3 is kept in contact with the blank by the action of spring *M*. The rear tool *N* is then advanced by the first lobe on the rear cam to lap one end of the blank over the other. (4) Next the rear tool is retracted, and section L_2 of the right-hand tool is advanced, as shown at *D*, by a second lobe on the right-hand cam, to complete the lapping operation. (5) Section L_2 of the right-hand tool is again withdrawn, as seen at *E*, and section K_2 of the left-hand tool is further advanced by means of an auxiliary slide on the multi-slide machine. This action folds the lap previously formed over onto the stamping, as shown. (6) Final forming is accomplished, as indicated at *F*, by retracting both right- and left-hand tools, and advancing the rear tool by means of the second lobe on the rear cam. The finished lap-joint ring is then stripped from the forming post.

Drilling and Tapping Machines Mounted on Ways to Increase Work Range

By F. J. AUSTIN
Kaukauna Machine Corporation
Kaukauna, Wis.

IN a large Diesel-engine plant, provision had to be made for drilling and tapping cover and plate bolt-holes in both ends of cylinder crankcases of different sizes. In many instances, the work was so large that it could not be placed on a conventional type of machine tool, nor was it considered feasible to place the work in a pit under a radial drilling machine. The latter practice would have necessitated the provision of a special holding fixture and would have involved an excessive amount of work-handling.

The problem was solved in the following way: One section of the machine shop consists of an area 20 feet long by 12 feet wide, covered by floor plates. Steel ways were constructed the full length of these floor plates along one side to carry a horizontal drilling and tapping machine, as shown in Fig. 1. With this arrangement, the Diesel-engine components can be placed anywhere along the floor plates and machining operations readily performed by positioning the machine along the ways as required. Thus the engine crankcases can be rapidly set up for drilling, tapping, and facing the ends. The total time required for this work has been reduced from the eight hours necessary by the method previously employed to four hours. In addition, accuracy and finish of the engine blocks have been improved. Drill jigs are used for rapid location of the holes.

The working capacity of this machine has been further increased by providing 8 feet of vertical travel of the head on the over-size column. The swiveling head, which is a standard feature of the machine, permits the spindle to be set at any angle between 45 degrees above and 45 degrees below the horizontal position.

Another application of the use of ways for increasing the work range of a machine is shown in Fig. 2. Here a Kaukauna drilling and tapping machine is equipped with a standard 4-foot runway. The machine is being used for drilling a series of staggered holes in two rows, 2 inches apart, around a drying kiln component. The kiln

Fig. 1. A horizontal drilling and tapping machine set up on ways constructed along one side of long floor plates enables drilling, tapping, and facing operations on Diesel-engine blocks to be conveniently performed

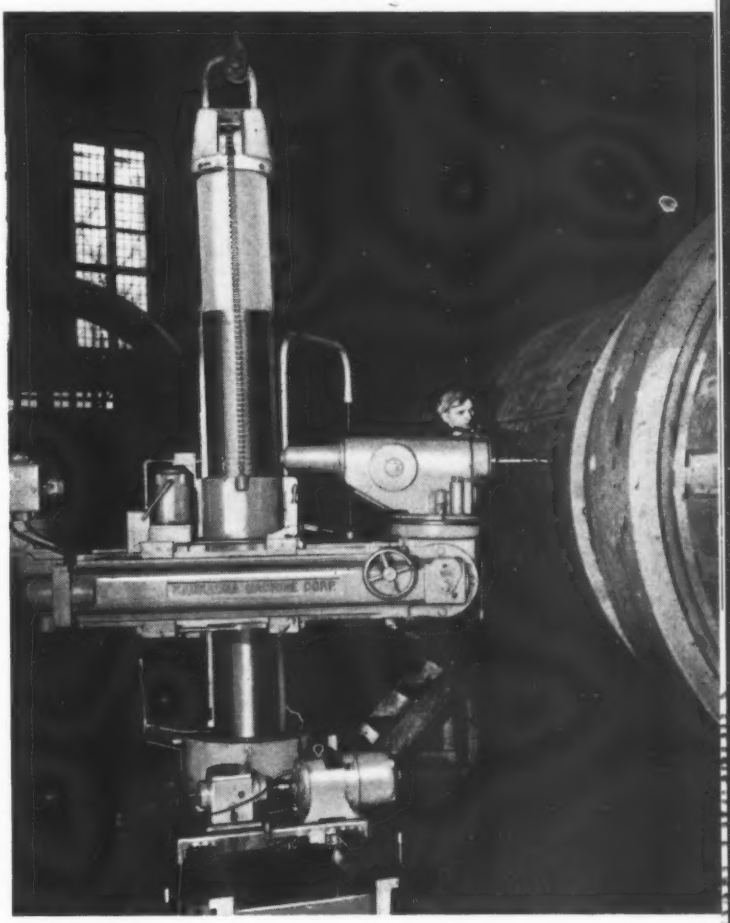


Fig. 2. Using a portable drilling and tapping machine for producing eighty holes around a large drying kiln

is 6 feet in diameter and requires forty holes, 1 3/16 inches in diameter, in each row, or a total of eighty holes through the 1-inch steel plate.

Vertical movement of the machine head and rail rapidly positions the spindle for drilling. Because of this movement, it is only necessary to index the huge kiln five times to reach all the holes, sixteen holes being drilled in each position. Less flexible drilling equipment used previously, required indexing the kiln ten times to bring it into correct position for the drilling operation. Thus, only eight holes could be drilled at each indexing, which increased the over-all set-up time.

Approximately ten minutes is required to place the portable machine in position for drilling, and the rows of staggered holes are drilled complete in six hours.

Equipped with the standard runway and a lifting bail, machines of this type can be readily transported about the shop by means of an overhead crane. They are especially advantageous for work of a size and shape that precludes handling on other types of machine tools.

History of Electric Arc-Welding

ELECTRIC arc-welding was born with electricity itself. It dates back to about 1880, when direct current was still in its merest infancy and alternating current, as we know it today, was still unborn.

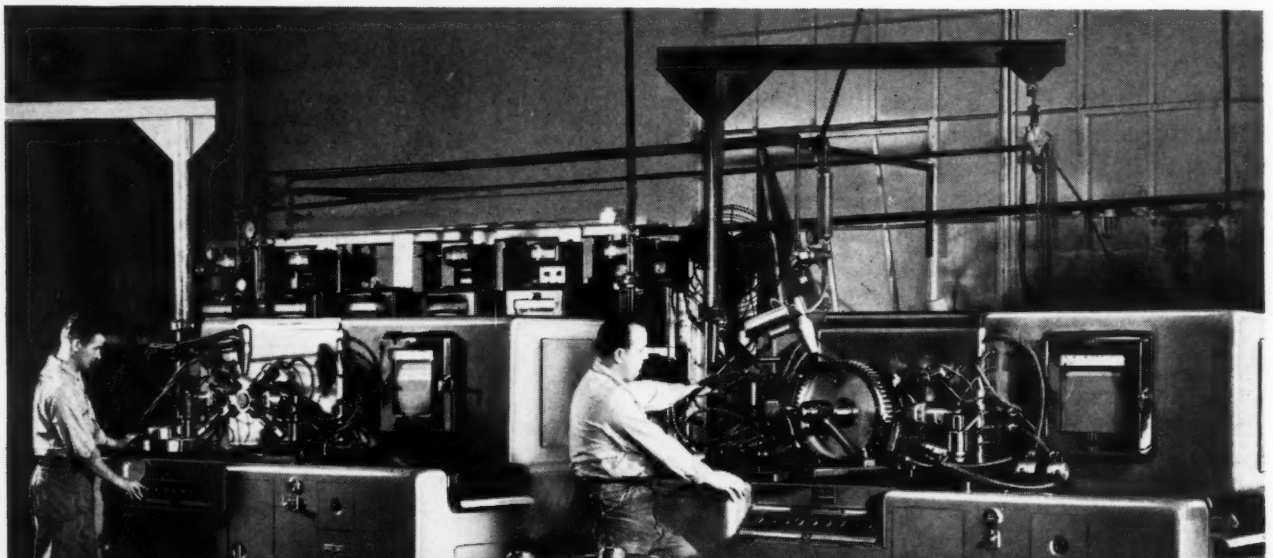
Electric welding was first successfully accomplished by Bernardos and Demetrus in Russia as a manual process, using direct current, a carbon electrode, and a metal filler rod. A few years later, Slavianoff, another Russian, perfected the technique of using a bare rod as an electrode. In 1907, Kjellberg developed, in Sweden, the first coated rod, but it was good only for use with direct current.

Arc-welding remained in this form for some thirty years, virtually unchanged, although coated electrodes that produced better welds were introduced. But developments of the past decade have produced significant changes that have vastly broadened the flexibility of arc-welding. First is the perfection of electrodes and machines for alternating-current welding, which has greatly increased in popularity, especially since 1940; second is the perfection of equipment for automatic welding, which, spurred by the rising cost of labor, has replaced manual welding for many tasks; third is inert-gas welding; and fourth are the multitude of new electrodes that have greatly increased the range of arc-weld.ng.—*Westinghouse Engineer*

* * *

The power house of the Ford Motor Co.'s Rouge plant produces every day enough electricity to satisfy the domestic requirements of a city of 3,000,000 persons. The coke ovens manufacture enough gas to supply the needs of a city of 1,500,000 persons. Three blast furnaces produce 3200 tons of steel every twenty-four hours.

Selective Surface Hardening



IT is frequently unnecessary or undesirable to harden a steel part throughout its entire cross-section. This can be avoided by applying heat to the surface of the part at a sufficiently high rate so that the heat is concentrated at the surface, the center being but slightly heated. Then, by quenching the part the instant the desired surface zone has reached the required temperature, the specified hardness pattern can be obtained.

For many years, the oxy-acetylene and oxy-propane flames have been widely used for this localized or selective type of surface hardening. There are four methods most commonly employed for flame-hardening—the stationary method, where both the part to be hardened and the source of heat remain stationary; the progressive method, where there is relative motion between the work and the source of heat; the spinning method, where the part is rotated and the heating head remains stationary; and the progressive spinning method, where the source of heat is moved axially along the rotating part.

With all these methods of flame-hardening, in the past, precautions had to be taken to avoid overheating of the surface, cracking of the part during quenching, distortion, and non-uniformity of results. The troubles encountered were due to the problems of confining the heat to the portion of the work to be hardened, precisely controlling the temperature to which the area was heated (and the time required to reach this temperature), and determining the exact moment of quenching.

To overcome these difficulties, engineers of the Cincinnati Milling Machine Co. early in the last war developed a "Flamatic" hardening machine to permit rapid flame-hardening of selected surfaces on parts at the company's own plant. By combining the advantages of localized heating, through the medium of oxy-acetylene flames, with accurate temperature control by means of a sensitive thermopile, the machine permits the selective surface hardening of parts to exacting metallurgical specifications and close dimensional tolerances. The success of the machine on both production and short-run jobs led to its being marketed commercially.

with High-Temperature Flames

Exacting Metallurgical Specifications and Close Dimensional Tolerances Can be Maintained, and the Results Consistently Duplicated, by Selective Surface Hardening with the Flame Spinning Method

By CHARLES H. WICK

Flame-hardening on the Flamatic machine is generally accomplished by the spinning method, where the part to be hardened is rotated and the adjustable flame heads remain stationary. In some cases, the work-piece and torch heads are both held in a fixed position, as in the hardening of discontinuous surfaces of cams for automatic transmissions (see Fig. 9). Gears up to 18 inches in diameter and selective surfaces on shafts up to 30 inches long which weigh as much as 150 pounds have been hardened on this machine. Simple arbors of bar stock turned to the desired diameter (Fig. 1), tapered arbors, mounting plates, centers, or chucks can be employed to hold different types and sizes of work. The work speed can be infinitely varied from 0 to 400 R.P.M. by means of a thyratron control on the 1/2-H.P. motor that drives the work-spindle.

From one to four adjustable flame heads can be used on the machine. Each head is drilled and tapped, permitting as many as thirty burner tips to be screwed in place. Plugs can be inserted in the tapped holes to vary the heating rate or to form any desired pattern of hardness on the work. Special flame heads have been developed for hardening several surfaces on long shafts. Air-actuated flame heads that automatically retract to permit face hardening or to accommodate parts having more than one diameter can also be used. The flame-head mounting fixtures provide cross, longitudinal, vertical, and angular adjustments in positioning.

Acetylene and propane are the fuel gases most widely used for flame-hardening. When acetylene is mixed with oxygen in the approximate ratio of 1 to 1, a neutral flame of about 5600 degrees F. is obtained. Flame temperatures can be increased up to 6200 degrees F. and surface temperatures can be raised as much as 500 degrees F. per second. Gas consumption varies with the depth to be hardened. For hardening 1 square inch of steel to a depth of approximately 1/8 inch, about 0.15 cubic foot of acetylene is required. When propane is used as the fuel gas, it is mixed with oxygen in the ratio of 1 to 4. Propane has a higher heat value, in B.T.U.'s per cubic foot, than acetylene, but provides a lower flame temperature when mixed with oxygen. The flame heads are cooled by cir-

Fig. 1. Gear to be flame-hardened is placed on an arbor projecting between two flame heads. The speed of the gear can be varied from 0 to 400 R.P.M.

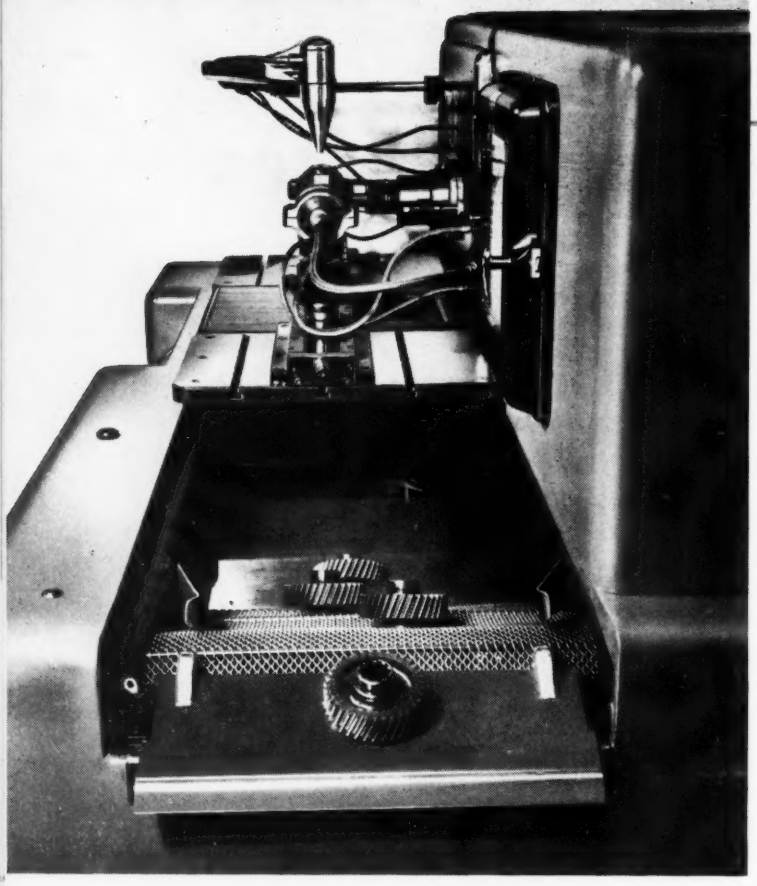


Fig. 2. An endless woven-wire conveyor extending into the quench tank carries the hardened parts onto a take-off plate seen in the foreground

culating water. Adjustment of gas flow to each flame head is obtained by individual needle valves.

Spindle rotation and torch operation can be controlled manually or automatically by means of push-buttons. Two electrodes ignite the flame heads and then retract from the heating zone. Flames from the heads impinge on the rotating surfaces of the part to be hardened, heating them to a pre-set temperature. A sensitive thermopile is focussed to receive radiant energy from the rotating work, the amount of radiation being directly proportional to the temperature of the surface. The voltage thus generated in the thermopile is transmitted to a temperature recording and controlling instrument.

As soon as the surface of the part reaches the pre-set temperature, the flames are automatically extinguished, the spindle stops rotating and is retracted, and the part falls into the quench tank directly below (see Fig. 2). An endless woven-wire conveyor extending into the quench tank carries the part out of the quench to a take-off plate at the right-hand end of the machine. Speed of the conveyor can be infinitely varied from 0 to 60 inches per heating cycle. Parts weighing 20 pounds or more should be dropped on a baffle board above the quench tank or lowered onto the conveyor by means of tongs or a quick-acting hook to prevent damaging the part or the machine.

Since the heated area is enveloped quickly and completely with the quenching medium, distortion and cracking are practically eliminated. The rapidity of quenching, in some cases, increases the hardness over that obtained with other methods where the part has to be transferred to a quench tank. Also, the uniform depth of heat penetration resulting from the close temperature control minimizes distortion. Either oil or water is used as the quenching medium, depending upon the material being hardened and the metallurgical specifications. During the heating cycle, if the part is quenched within a second or less after reaching the critical temperature, oxidation is held to a minimum.

Any type of hardenable carbon or alloy steel, including some stainless steels, can be flame-hardened. Fine-grain steels with a carbon-content of from 0.35 to 0.65 per cent generally produce the best results with this method of hardening. Alloying elements in the steel increase the rate but not the degree of hardening. Parts to be hardened should be clean and free from scale to prevent the formation of soft spots. Hardnesses as high as about 60 Rockwell C have been obtained in flame-hardening Meehanite castings, compared with a maximum hardness of about 50 Rockwell C obtained with previous methods.

Optimum hardness can be produced on the specified surfaces of the part without affecting the core. When different properties are desired in the core, the core can be treated before the part is flame-hardened. Below the surface is a transition zone where the hardness is gradually reduced until the core hardness is reached. By adjusting the rate of heat input, the depth of the fully hard and transition zones can be varied. The usual depth of hardness produced in flame-hardening is about 3/32 inch.

Since the flames can be directed to localized areas, any surfaces on the part can be selectively hardened. Minimum scaling and no pitting are encountered with this process, and any slight discoloration resulting can be removed by sand-blasting.

An installation of two Flamatic hardening machines at the Unit Crane & Shovel Corpora-

tion, Milwaukee, Wis., is seen in the heading illustration. The machines are used for surface-hardening an unusually wide range of parts at substantial savings over previous methods. Gears hardened in this way, which have been in service for some time, have required less maintenance than those hardened by other methods. A drawing operation required on these low-speed, highly loaded gears after previous methods of hardening has now been eliminated.

Forged AISI 8750 steel bevel gears having a pitch diameter of 12.666 inches, an outside diameter of 13.417 inches, and 19 teeth of 1 1/2 diametral pitch are flame-hardened at the rate of five per hour by means of the set-up seen in Fig. 3. A hardness of 45 to 50 Rockwell C is imparted to the gear teeth. The entire working depths of the teeth are hardened, with the deepest penetration and maximum hardness at their pitch points. Hardening is avoided at the roots of the teeth to prevent cracking or breaking.

Four flame heads, each equipped with thirty burner tips spaced about 5/8 inch from the surface of the teeth, are employed in this set-up. Oxygen under a pressure of 50 pounds per square inch and propane at 5 pounds pressure are fed to the heads. The gear is rotated at 40 R.P.M., and the teeth are heated to 1530 degrees F. in nine minutes. A chain hoist is used to lower the gear into an oil quench. The hardened gear teeth are finished by blasting with a finely powdered abrasive suspended in a water emulsion.

The spur gears shown being flame-hardened on the right in the heading illustration have an outside diameter of 16.899 inches and 66 teeth of 4 diametral pitch. The gears are forged from S A E 1045 steel. Pressure of the propane fuel gas is increased to 11 pounds per square inch for this job. The surfaces of the teeth are heated to 1560 degrees F. in one minute and fifty-five seconds, giving a production of fifteen gears per hour. A hardness of 40 Rockwell C results from this heating cycle and oil quench. Propane consumption is at the rate of 2 1/2 cubic feet per burner tip per hour.

Previous methods of hardening these gears required more than an hour per gear, since only eight gears could be loaded into the furnace at one time, and a ten-hour heating cycle was necessary. Also, the splined bore had to be packed with sand to minimize distortion during hardening, and the bore had to be broached after hardening. With flame hardening, both packing and broaching operations have been eliminated, as distortion is held to a minimum. Also, a sand-blasting operation formerly required after hardening is no longer necessary, practically no scale being formed on the teeth in flame-hardening.

Cluster gears 12 inches long, with pitch diameters of 5.333 and 9.333 inches, are also flame-hardened at the plant mentioned. The larger diameter end of the 60-pound cluster gear is hardened in a six-minute cycle, and the smaller diameter end in a four-minute cycle.

S A E 4140 steel drive-shafts for gear reduction units are selectively hardened, as shown in Fig. 4, at the rate of 200 per hour by the Rockford Clutch Division of the Borg-Warner Corporation. Two diameters (the splined portion of the shaft and the adjacent bearing surface on

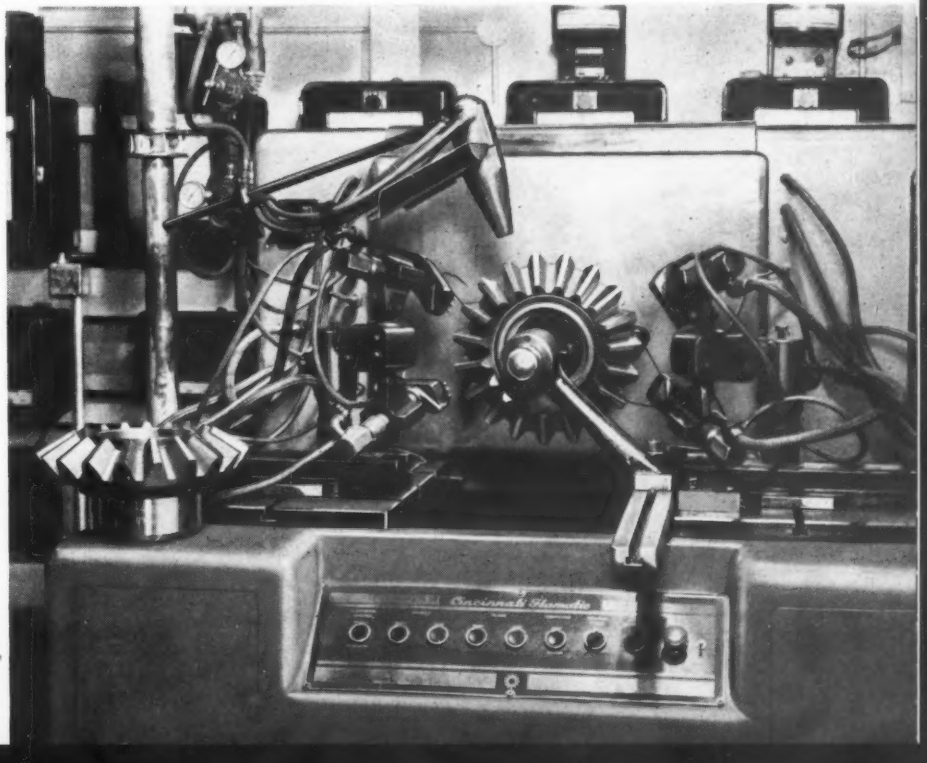


Fig. 3. Forged steel bevel gears are flame-hardened at the rate of five per hour in this set-up. A hardness of 45 to 50 Rockwell C is imparted to the teeth

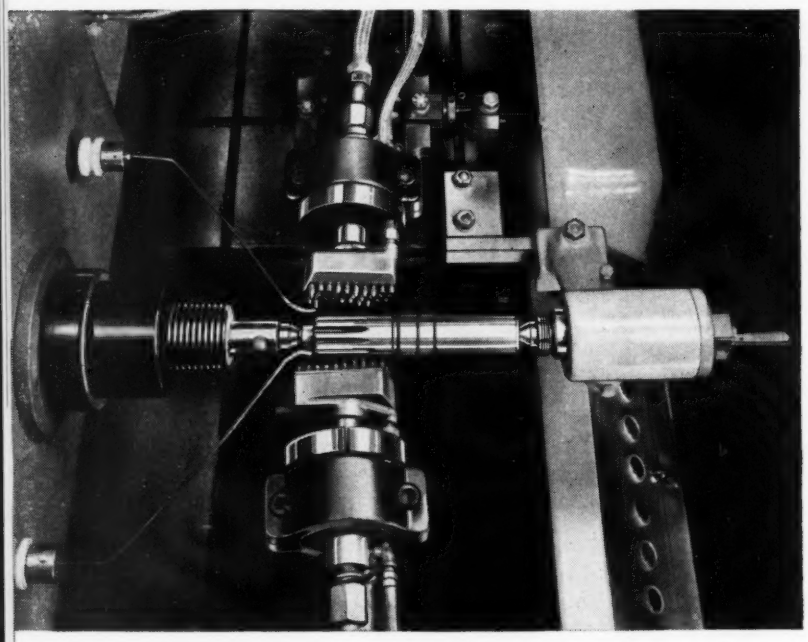


Fig. 4. Plugs are inserted in some of the openings in the flame heads to concentrate the heat on the two surfaces to be hardened

the pilot end) are hardened simultaneously. The shafts are 1 1/2 inches in diameter by 9 1/16 inches long. They are held between centers on the Flamatic and rotated at 100 R.P.M.

Some of the openings in the standard flame heads are plugged, so as to concentrate the heat on the two surfaces to be hardened. These surfaces are heated to 1560 degrees F. in twelve seconds. The driving spindle, seen at the left, is then automatically retracted to quench the part in the oil tank directly below. A hardness of 50 Rockwell C is obtained with negligible distortion. The flame-hardened surfaces require no subsequent machining or cleaning.

The teeth of a bevel pinion and integral shaft weighing 95 pounds are shown being flame-hardened in Fig. 5 at the Perfection Tool & Metal Heat Treating Co., Chicago, Ill. This part is made from S A E 3140 steel, and has an over-all length of 20 1/2 inches. The bevel pinion has an outside diameter of 8 inches, and its teeth are of 2 diametral pitch with a face width of 3 3/4 inches.

Although the size of this part would suggest the use of four flame heads, only two are employed, as seen in Fig. 6. This is due to the hardness pattern specified for the teeth and the size of the teeth, which make it necessary to heat at a slow rate in order for the heat to penetrate to a sufficient depth. The automatic heating cycle

Fig. 5. Set-up for flame-hardening the teeth of a bevel pinion and integral shaft weighing 95 pounds. Seven parts are hardened per hour

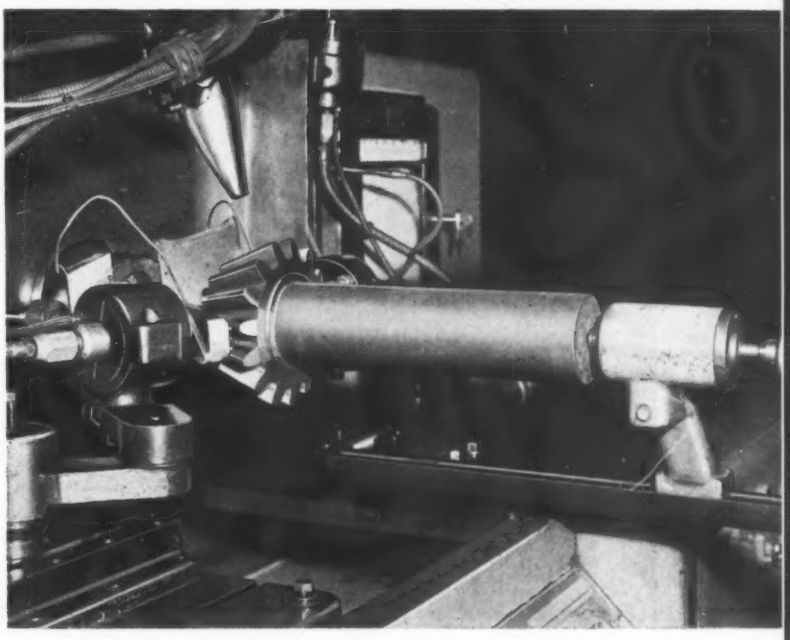


Fig. 6. Close-up view of the flame-hardening operation seen in Fig. 5. Only two flame heads are used to allow the heat to penetrate into the teeth

requires five minutes, followed by a five-second delay before the heated part is quenched in oil. Delayed retraction of the spindle after the work has been heated to the required temperature can be adjusted by a timer switch. The resulting hardness of the teeth is from 53 to 55 Rockwell C. A subsequent flame-heating operation is employed to draw the teeth back to a hardness of from 48 to 52 Rockwell C.

Cast spur gears having an outside diameter of 13 inches and a face width of 2 inches are selectively surface-hardened, as seen in Fig. 7, in a heating cycle of one minute and forty seconds by the same company. These gears are also made from S A E 3140 steel. Because of the spoke design of these cast gears, distortion was quite a problem when previous heat-treating methods were used. With flame-hardening, distortion is held to a minimum and run-out of the outside diameter is maintained within 0.0015 inch. A hardness of from 50 to 55 Rockwell C is imparted to the gear teeth.

The teeth of the large bevel pinion shown in Fig. 8 are flame-hardened in a heating cycle of two minutes and ten seconds. Four thirty-tip flame heads are employed to heat this S A E 3140 steel gear. The pinion has an outside diameter of 11 inches and weighs 67 pounds. Its teeth are of 3 diametral pitch, and have a face width of 4 inches. The arbor on which the gear is

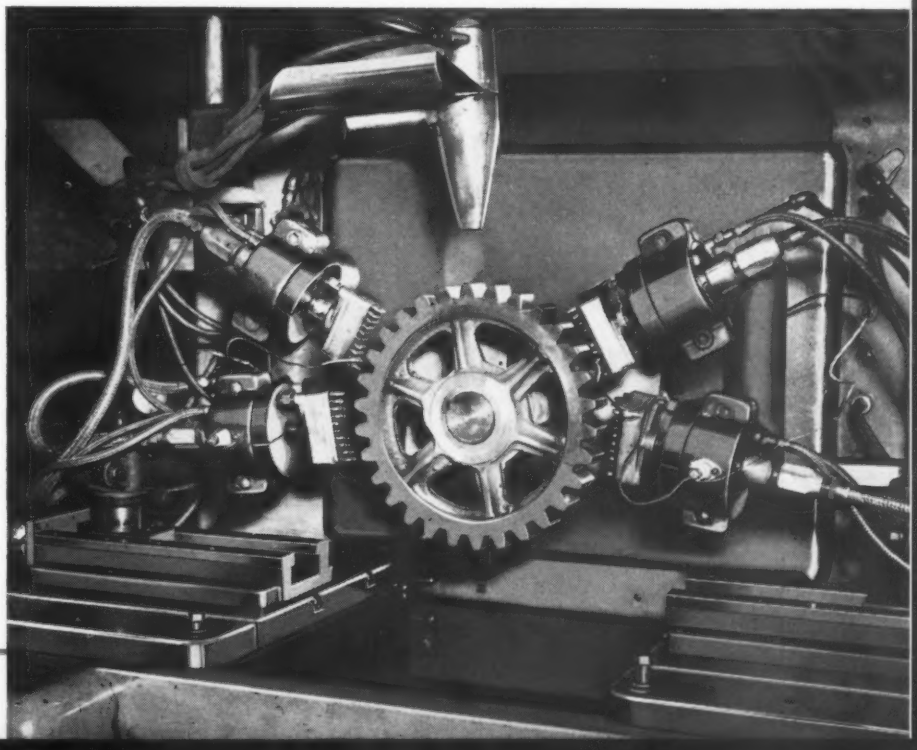


Fig. 7. Cast spur gears of spoke design are hardened rapidly, uniformly, and with a minimum amount of distortion on Flamatic machines

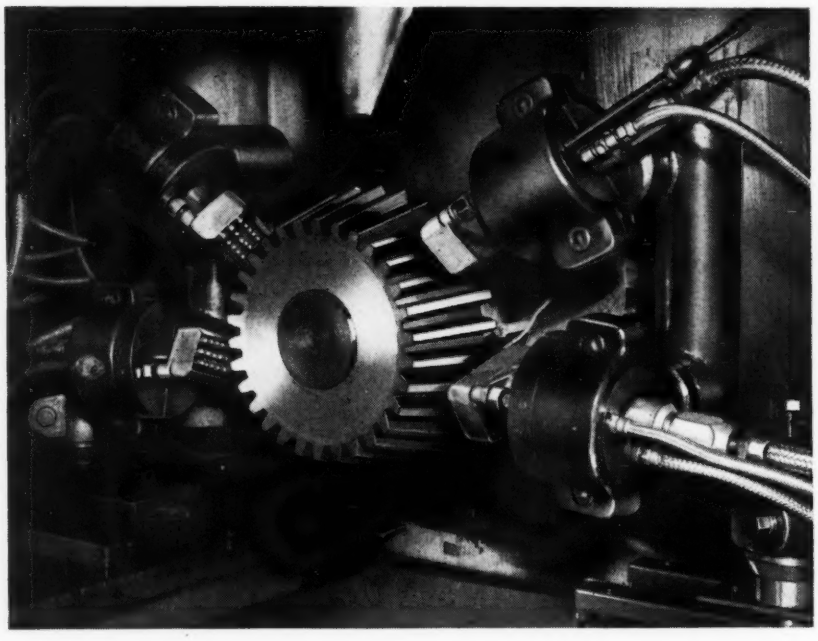


Fig. 8. Four flame heads, each containing thirty burner tips, are employed to harden this large bevel pinion in a heating cycle of two minutes and ten seconds

mounted is retracted after heating by means of a foot-pedal controlled air cylinder. A hook is employed to lower the heavy part into the oil tank. Resulting hardness of the teeth is from 55 to 57 Rockwell C.

An unusually difficult heat-treating operation performed successfully on the Flamatic consists of selectively flame-hardening internal surfaces on automotive torque-converter transmission cams. Six internal lobes on the over-riding clutch cam are hardened in a single operation at a production rate of 187 cams per hour. With previous methods, using three different hardening machines and two operators, only 67 cams could be produced per hour.

The cam and work-spindle do not rotate in this case, as they did in the applications previously described. The cam to be hardened, which is 3 5/8 inches in diameter by 1/2 inch wide, is placed on fixture *A*, Fig. 9, being located by means of lugs *B*. The single flame head employed consists of a brass burner *C* containing six rows of gas ports *D* from which the flames issue and impinge on the six internal lobes of the cam (not shown). Steel inserts *E* are provided around the periphery of the brass burner to prevent it from becoming worn when the parts are loaded and unloaded.

An ejector plate *F* strips the heated cam from the fixture when the combination work-spindle and flame head is retracted at the end of the heating cycle. The cam falls down a chute into the oil quench tank. Both flame head and ejector plate are water-cooled. Only a nine-second heating cycle is required, and the cam lobes are hardened to between 60 and 64 Rockwell C. Uniformity of results is achieved, scrap losses are eliminated, and distortion is negligible.

Fig. 9. Combination work-spindle and flame head is employed to selectively flame-harden six internal lobes on automotive transmission cams

The Miracle of America

ITALIAN industrial representatives on a commission that recently made a tour of American manufacturing plants under the auspices of the Economic Cooperation Administration were amazed by the fact that virtually every worker in the plants that they visited had his own automobile. They concluded that it is as easy for a workman to possess an automobile in this country as to own a bicycle in their native land.

This is tangible evidence that our economic system has brought greater rewards to more people than any other system that the world has ever known. Because we turn out more goods and perform more services for every man-hour worked, we outproduce all other nations, even though their population may be greater, and enjoy the highest standard of living in the world.

All this has been said and proved so many times that it seems preposterous that many Americans do not have the slightest idea of what makes our system work or how it can be made to work even better. Before we can expect other peoples of the world to adopt our economic system, we, ourselves, must fully understand and appreciate its advantages. This is the goal of a campaign sponsored by the Advertising Council and endorsed by such important labor leaders as Philip Murray and William Green, by representatives of large companies, and by public-minded citizens. The basic principles of our economic system have been outlined as follows in a booklet entitled "Miracle of America":

1. Freedom of the individual to work in the callings and the localities of his choice.
2. Freedom of the individual to contract about his affairs.
3. Freedom of the individual owner of property to start and manage an enterprise, to invent and profit, to invest, to buy and sell in a free market—in so far as this freedom does not conflict with the public interest.
4. Freedom of the individual to speak, to inquire, and to discuss.
5. Protection for the individual—by public or private means—against the basic hazards of existence, over which he may have no control.
6. Government action in economic affairs to insure national security or to undertake socially desirable projects when private interests prove inadequate to conduct them.
7. Freest possible competition consistent with the public welfare.
8. Free collective bargaining—the right of labor to organize.
9. Expanding productivity as a national necessity.
10. Increased recognition of human values as a prerequisite to better living.

The aim of the campaign is to show that management, labor, and all other groups agree that our system has but one purpose, and that is to strive for a better living for all; to point out that this purpose is achieved by higher productivity and wider distribution of its benefits; to expand public understanding of the role of free collective bargaining; to show that economic freedom and political freedom are dependent upon each other; and to drive home the fact that with management, labor, and the public working together everyone will enjoy to the fullest degree all the best our system offers.

This campaign, in the words of the Advertising Council, "constitutes an aggressive answer to all the forces trying to undermine America."

Charles O. Herb

EDITOR

Selection of Carbide Grades and Recommended Cutting Speeds

This Article, which Presents Considerable Information of Value in Determining the Grades of Carbide to be Employed in Machining Various Types of Metal and the Preferable Speeds to be Employed, was Abstracted from a Chapter in a Forthcoming "Carboloy Tool Manual," Soon to be Published by the Carboloy Company

CEMENTED carbides are produced in a number of different grades, which provide various degrees of toughness, wear resistance, ductility, and strength. The specific grades are available to suit individual machining operations. Selecting the proper grade of carbide for a tool to be used for a particular job is fully as important as choosing the right machine for the job. Because there is no one cutting tool material that is equally efficient on all cutting jobs, an understanding of the various grades of cemented carbides available for cutting tools will result in better work finishes, greater accuracy, and longer tool life.

Various Grades of Carboloy Cemented Carbide Available for Cutting Steel

Four standard grades of cemented carbide are produced by the Carboloy Company, Detroit, Mich., for cutting steel, and five standard grades for cutting all other materials. The steel cutting grades are tungsten carbide, with definite amounts of tantalum carbide or titanium carbide, or both, added to provide qualities that are desirable for cutting steel. The grades for cutting materials other than steel are straight tungsten carbide.

In the steel cutting group, there is a precision finishing grade (831) which possesses the highest resistance to wear and is intended especially for high-speed finishing cuts that must be made to close tolerances. While the wear resistance is high in comparison to the other cemented carbides intended for cutting steel, the resistance to shock is comparatively low.

Another grade (78) possesses high resistance to abrasion and a toughness sufficient to make it adaptable for finishing and light roughing cuts on practically all types of steel. This cemented carbide has medium high resistance and medium shock resistance.

There is a general-purpose machining grade (78B) which is the best grade for a user not experienced in machining steel with cemented carbides. It is a tough wear-resistant grade suitable for the general-purpose machining of practically all types of steel, and can be used to some extent on Monel metal.

Another steel cutting grade (78C) is intended for use in heavy-duty operations, especially where interrupted cuts are involved. This cemented carbide is suitable for starting the machining of steel parts on large heavy-duty machines, such as 9- to 12-foot boring machines and lathes of 36- to 48-inch swing. It possesses higher resistance to shock and lower resistance to wear than Grades 78 or 78B.

Grades of Carboloy Available for Cutting Materials Other than Steel

There is a Carboloy cemented carbide grade (999) available for precision finishing operations that resists the high abrasion of centrifugally cast iron and alloy irons, the shock resistance being low in comparison with the other grades.

A wear resisting grade (905) maintains a good cutting edge in finishing and light roughing operations, and makes it possible to take long finishing cuts to close tolerances. This cemented carbide is especially suitable for light finishing cuts on alloy cast iron having a hardness up to 550 Brinell.

A general-purpose grade for use in production machining operations when close limits must be maintained is Grade 883. This cemented carbide combines medium resistance to wear with medium resistance to shock. It is suitable for both roughing and finishing and for one-cut finishing. It is sometimes used for taking light finishing cuts on steel. The best general-purpose machining carbide for the inexperienced user is Grade 44A. This is tougher than Grade 883, but not quite as resistant to wear.

For very heavy-duty operations, particularly when interrupted cuts are involved, there is Grade 55A, which is the toughest and therefore

the most shock-resistant grade produced for metals other than steel. It can be used for heavy cuts taken with heavy feeds and slow speeds. This grade is suitable for machining cast-iron parts, and occasionally for steel, when very severe and slow-speed jobs are encountered.

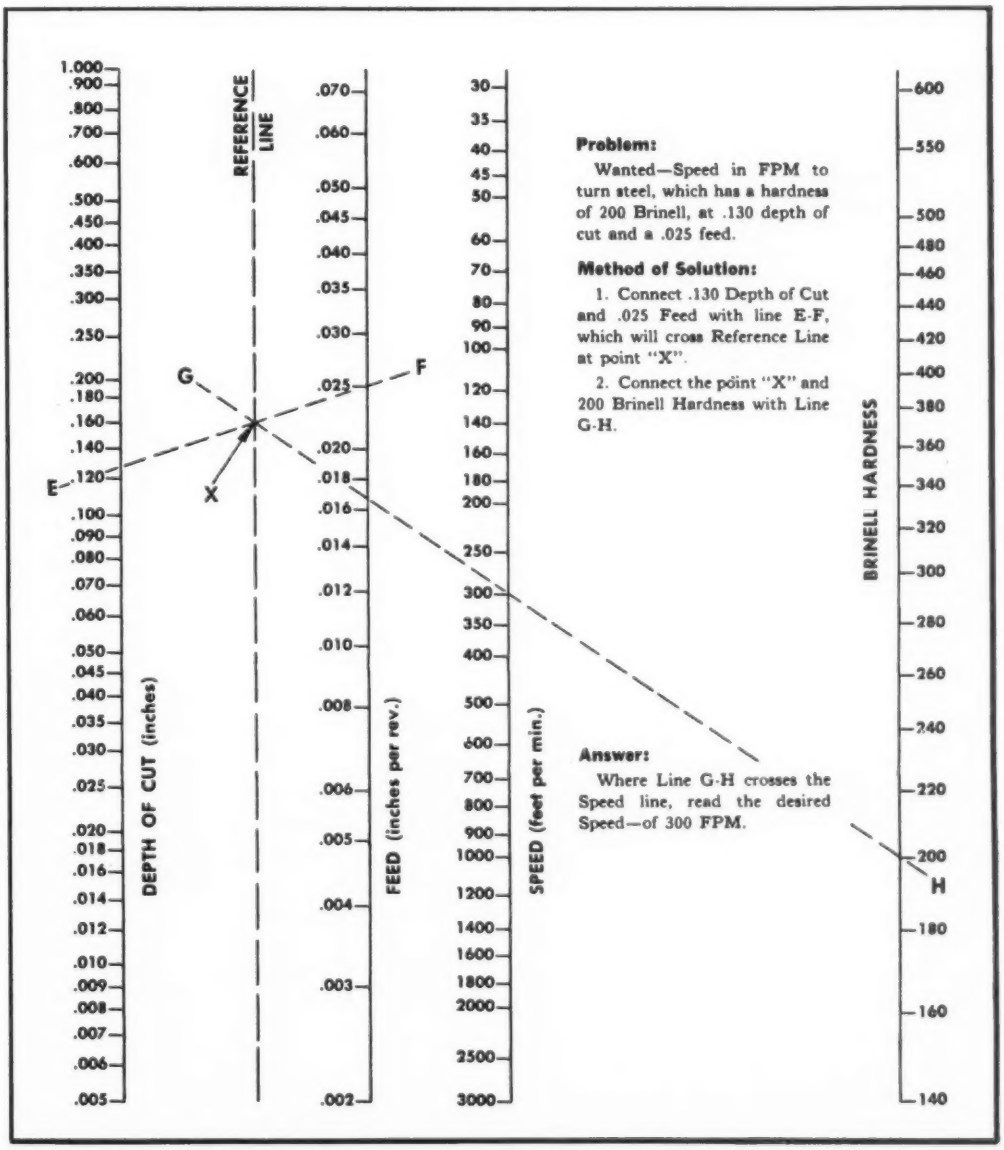
Why Different Grades of Cemented Carbide are Necessary

Different grades of cemented carbide are required because of variation in the materials machined. For instance, some work materials have an abrasive action on the cutting tools, which tends to grind away the clearance provided on the tool. Other materials produce a cratering action, in addition to having some abrasive effect, which results in a pocket being developed on top of the cutting tool.

Cast-iron and non-ferrous materials, such as some brasses and bronzes, are highly abrasive, and tend to wear the cutting tools rapidly directly on the cutting edge, contrasted with the cratering action behind the cutting edge produced when machining steel. For these metals, carbide manufacturers recommend that straight tungsten-carbide tools be used. Carbides of this classification are made in various grades, as already outlined, to meet the many different machining conditions.

Generally speaking, steels have a tendency to produce craters rather than to abrade, and for this reason carbides containing tungsten and either tantalum or titanium, or both, are usually recommended for machining steel.

Aluminum and magnesium alloys tend to produce a built-up edge on form tools, and for operations on these metals, the Carboloy Company



Nomograph chart which facilitates quick determination of carbide tool cutting speeds when depth of cut, feed, and Brinell hardness of the material are known

recommends Grades 999 or 905. The hot flash formed in the manufacture of welded tubing is extremely difficult to machine, and for operations on such parts, special grades of cemented carbide are produced, which are intended solely for this use.

There are other materials that have unusual machining characteristics necessitating special grades of cemented carbides. Among these are certain types of stainless steels; Hadfield manganese steel; certain centrifugally cast irons; malleable irons; and some semi-steels. In machining these metals, careful studies should be made to determine the type of wear they cause on the cemented carbide in order to insure selection of the proper carbide grade.

Cutting Speeds for Machining Steel with Carbide Tools

Years of experience in machining steel have proved that there is a relationship between the hardness of steel, depth of cut, cutting speed, and feed for a specific tool life. In other words, if the hardness of the steel to be machined is known, it is possible to select a suitable cutting speed for a given depth of cut and feed per revolution when using a carbide-tipped single-point tool.

The following empirical formula has been developed on the basis of this relationship:

$$S = \frac{29{,}000}{D^{0.25}\, F^{0.42}\, B^{1.25}}$$

in which

S = recommended cutting speed, in feet per minute;
D = depth of cut, in inches;
F = feed, in inches per revolution; and
B = hardness of steel (Brinell reading).

Example—Find the recommended cutting speed, in feet per minute, of a carbide tool for cutting steel having a hardness of 200 Brinell, when the depth of cut is to be 0.128 inch and the feed 0.025 inch.

Solution—$D = 0.128$; $F = 0.025$; and $B = 200$. Hence

$$S = \frac{29{,}000}{0.128^{0.25} \times 0.025^{0.42} \times 200^{1.25}}$$

As there are decimal exponents in this equation, logarithms will be used in the numerical solution.

Finding the logarithm of the denominator:

$\log 0.128^{0.25} = 0.25 \log 0.128 = 9.77680 - 10$
$\log 0.025^{0.42} = 0.42 \log 0.025 = 9.32713 - 10$
$\log 200^{1.25} = 1.25 \log 200 = 2.87629$
log of the denominator = 21.98022 — 20

Subtracting the logarithm of the denominator from the logarithm of the numerator:

$$\log 29{,}000 = 24.46240 - 20$$
$$-(21.98022 - 20)$$
$$\log S = 2.48218$$

$S = 304$ or, say, 300 feet per minute

Nomograph Chart for Selecting Steel Cutting Speeds

This empirical formula was used in developing the nomograph chart here illustrated for cutting speeds in machining steel with cemented-carbide tools. It is designed to cover a wide range of steel cutting applications with single-point tools, and its use simplifies the problem of selecting cutting speeds for the great majority of jobs.

When carbide cutting tools are being used, stalling of a machine because of insufficient power results in tool failure. To prevent this, tool engineers should make certain that adequate power is being transmitted to the work-spindle. Belts and clutches should be checked to make sure that the required power can be delivered to the spindle.

* * *

The Mount Palomar Telescope Also Has Plain Bearings

The following comment on a news item published on page 183 of February MACHINERY was recently received from Milton C. Shaw and Erwin G. Loewen, of the Department of Mechanical Engineering, Massachusetts Institute of Technology:

"In the note on the 200-inch Mount Palomar telescope equipped with 5600 ball and roller bearings, it is implied that this vast number of bearings is responsible for the amazing ease with which the telescope motion can be controlled. Without detracting from the value of ball and roller bearings, it is only fair to state that the main telescope bearings consist of four externally pressurized bearings which form a hydrodynamic oil film when oil is supplied under pressure by a pump. The characteristics of the externally pressurized bearing are such that the 1,000,000-pound load is supported on a film of oil with a coefficient of friction of but 2×10^{-6}."

* * *

A survey by the Economic Cooperation Administration shows that the current world production of most non-ferrous metals is considerably above pre-war averages.

Toolpost Grinders in Tool-Room and Maintenance Work

Last of Three Articles Describing Various Applications of Toolpost Grinders

By J. F. FISCHER
Manager, Sales Engineering
Simonds Abrasive Co., Philadelphia, Pa.

THE maintenance department of a plant is similar to the tool-room in many ways. The work is varied and must often be very accurate. The runs are short, consisting often of a single piece, requiring a half dozen machine set-ups within a day or so.

Toolpost grinders are useful equipment for both tool-rooms and maintenance departments because of their accuracy and applicability to any machine tool. As a matter of fact, grinders of this type were originally designed to meet the needs of the tool-room, which largely accounts for their versatility and accuracy.

Often it is economical for a maintenance department to make its own parts rather than send a part out to be made. Few maintenance departments have enough work to keep a production type of grinder busy all the time, but as toolpost grinders are applicable to maintenance department machine tools, they can be used frequently and advantageously.

Some examples of the use of toolpost grinders in a tool-room are described in the following. In one instance, a tubing manufacturer increased production rates 50 per cent by using these tools for grinding thread rolls. The rolls were held on an arbor in the headstock spindle of a lathe. A wheel-dresser, clamped to the tailstock, provided accurate dressing without disturbing the set-up.

Toolpost grinders are often employed to sharpen special cutters. In one such case, a 20-pitch cutter, designed for use on special magnesium alloy, was mounted on a lathe in conjunction with a thread-grinding attachment. After the outside diameter was trued up, the threads were ground with a 5-inch wheel, using a work speed of 4 surface feet per minute.

Many machine shops grind threads with a toolpost grinder and thread-grinding attachment, as shown in Fig. 1. The work is held between the centers on a lathe, the threading attachment on the compound rest, and the grinder on the attachment.

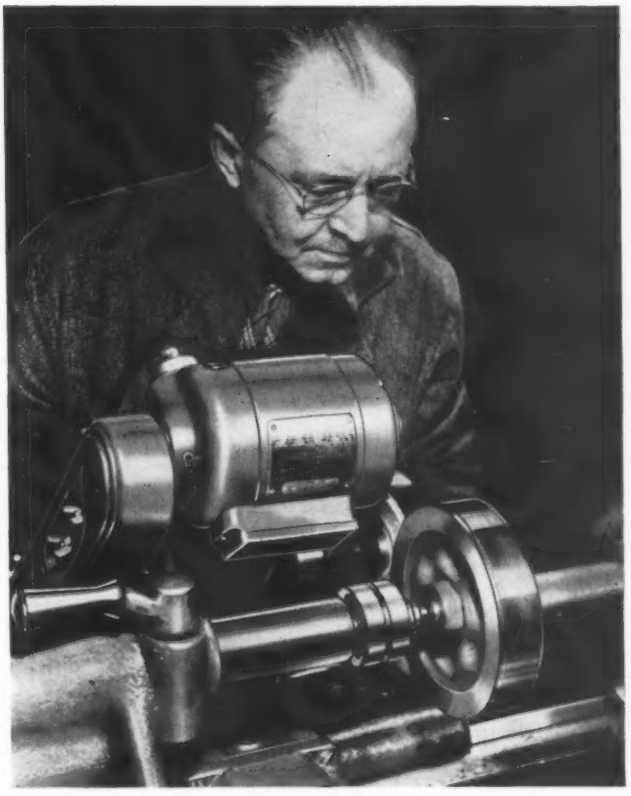


Fig. 1. Toolpost grinders are frequently employed on lathes for thread grinding

A toolpost grinder operates full time keeping the rolls of one mill in condition. The job consists of grinding a 180-degree groove around the outside diameter of a roll mounted on an arbor, which is chucked in the headstock of a lathe. The grinder is held at an angle on a special bracket on the rear cross-slide. Having the grinding machine mounted at the back gives the operator more freedom of action and allows him to examine the surface quality of the roll more easily.

Many shops that use rotary files find it most economical to send them to an outside shop for resharpening, but in some cases where large quantities of files are used, the company does the work in its own tool-room. The job can be easily handled by girls using toolpost grinders mounted on benches. It is only necessary to follow the contours of the worn teeth until the teeth are renewed by reasonably deep grinding.

A hob is shown in Fig. 2 held between centers for sharpening. This application of a toolpost grinder is somewhat unusual in that it is mounted on the over-arm of a milling machine.

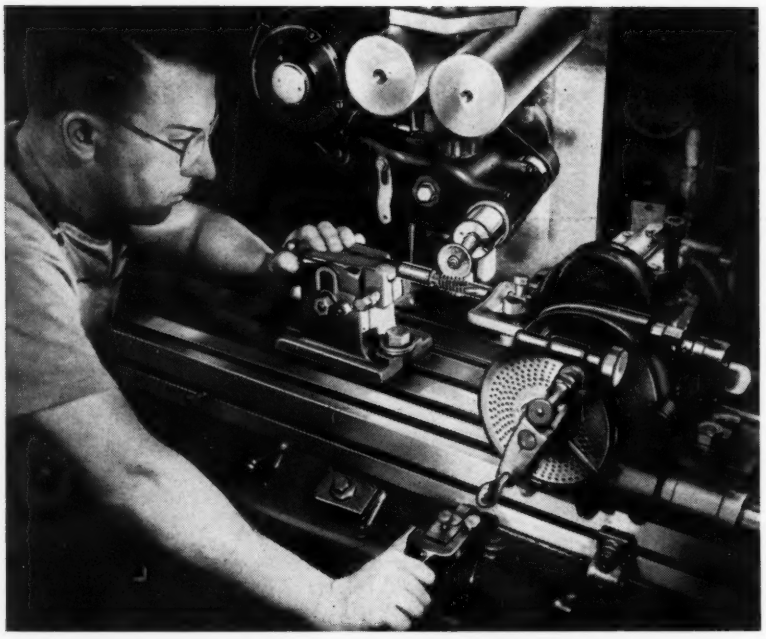


Fig. 2. An indexing head may be used with a toolpost grinder on a milling machine for grinding hobs

Toolpost grinders are particularly suited to grinding holes of small diameters. Fig. 3 shows the grinding of a 1/2-inch diameter by 1 1/2-inch deep hole on a grinder. The old grinding head which operated at 6000 R.P.M., was found to be much too slow. It was replaced by a toolpost grinder which has a speed of 42,500 R.P.M. This provided a mirror finish and ground the hole concentric and to size within a tolerance of 0.0001 inch.

Worn beyond the point of usefulness, a valve was reconditioned by the maintenance department of one plant. The first operation was to remove metal to the extent of 1/8 inch on the plug and to increase the diameter of the valve by 1/8 inch. A metallizing process was then applied to both parts by spraying on layers, about 0.003 inch thick, until the plug was over size and the hole was under size, after which both were ground to the correct size.

The drum shaft of a drop-hammer is held in a bearing with a water jacket and becomes badly rusted and corroded. Instead of machining a new shaft from bar stock, the rust is removed from the old shaft, stainless steel is sprayed on, and the shaft is ground to size with a toolpost grinder mounted on the compound rest of a lathe.

Few jobs are too large for refinishing with toolpost grinders. The large steel piston of a hydraulic hoist has been externally ground with a toolpost grinder mounted on a lathe in one

Fig. 3. The high speed of toolpost grinders considerably facilitates the internal grinding of small work, such as the hole-grinding operation here illustrated

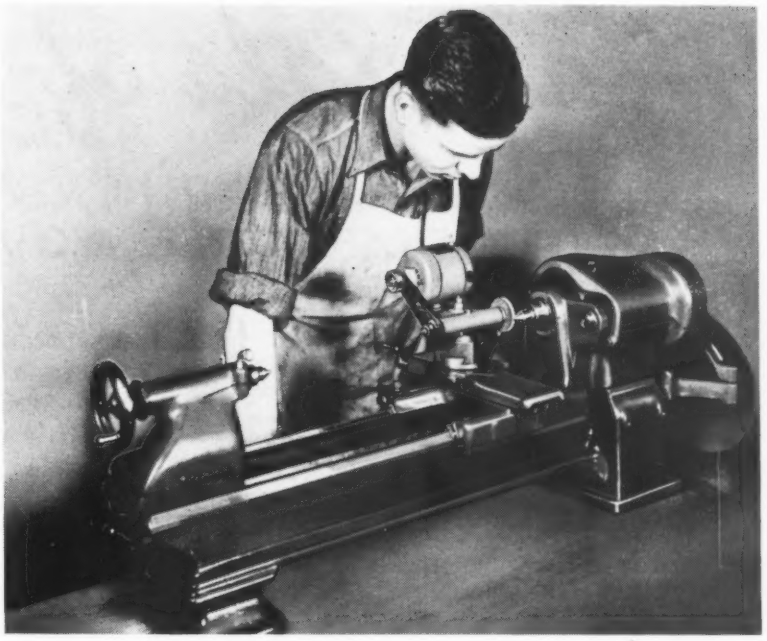


Fig. 4. Grinding lathe centers on a small lathe is a common application of toolpost grinders

shop. A somewhat similar job is the grinding of the bearing seat of a large marine shaft. On the other hand, small work is commonly encountered in maintenance work, such as the grinding of a lathe center on a small lathe, as shown in Fig. 4.

Textile mills and some printing plants use rubber rollers which must be reground once or twice a year to give a good surface. Very few of these mills have full-time use for a roll grinder, but if the plant owns a lathe on which a toolpost grinder can be attached, it can be employed enough to pay for itself. A roller-grinding operation is illustrated in Fig. 5. With good maintenance, rollers of this type have been known to last as long as twenty years.

For grinding, the roller is coated with powdered soapstone. On new hard rollers, it is customary to use a full 1/2-inch face wheel; when the roller has been worn, the wheel face should be reduced to have a 1/8-inch bevel edge; and when the rollers are nearly ready for scrapping, the wheel should be dressed still further until it has a slightly relieved knife-edge.

One shop that had a good many chucks to recondition after the jaws had become worn from gripping rough castings and forgings used a toolpost grinder for grinding the jaw teeth. In order to maintain accuracy and alignment, many maintenance departments grind such parts as chuck jaws and lathe centers while the work is in the operating position.

Fig. 5. Toolpost grinders offer a means of maintaining rubber rollers in good condition without resorting to the use of expensive grinding equipment

Materials of Industry

THE PROPERTIES AND NEW APPLICATIONS OF MATERIALS USED IN THE MECHANICAL INDUSTRIES

Screw Steel with Outstanding Machinability

The Jones & Laughlin Steel Corporation, Pittsburgh 30, Pa., has announced a new steel, available in cold-finished bar form, which can be machined from 10 to 25 per cent faster than the standard free-machining Bessemer screw steels. The new "E" steel, as it is designated, opens the way for increased production and lower costs in the manufacture of nuts, screws, studs, fittings, and other machined products.

Exhaustive field tests in the development of this steel show a machinability index as high as 170—nearly 25 per cent higher than B-1113, the former fastest machining Bessemer screw steel. In addition, it has a smoother finish after machining, better cold-working and cold-forming properties, and gives longer tool life on screw machines.

During the experimental stages, the new steel was tested by forty-five industrial manufacturers. A total of 6178 tons was used in these tests. The results recorded in typical reports on trial runs were as follows:

A large producer of nuts stated that by using "E" steel production was increased 15 per cent, as compared with the use of B-1113 steel, and the finish was excellent. Another nut manufacturer said production had been increased on certain machines from an average of 1607 pieces per hour to 1832 pieces per hour, and tool life was doubled.

In the manufacture of business machines, an increase of 100 per cent in tool life, as well as uniformity of finish in the machining of small parts, was reported Almost identical results were recorded by a producer of machined sleeves. 201

Combination Cleaner and Phosphate Coating Compound

A new cleaning and phosphate coating material designed to provide a base coating on steel and other ferrous metals preparatory to painting has been placed on the market by Detrex Corporation, Detroit 32, Mich. This material, known as Detrex 79, is a yellow, non-corrosive cleaning compound in dust-free powder form. Used in heated water solutions at low concentrations, it produces a light crystalline phosphate film on metal parts.

This combined cleaning and coating action reduces the cost, time, and number of operations in a production set-up. The parts come from the process with a clean water-wet surface that dries to a uniform blue-gray finish, either in the air or in a blow-off stage of the operation.

Surfaces treated with the new compound provide a better paint bond, and after painting, show exceptional rust inhibition properties under salt spray tests. 202

Isolating Paste Utilized for Selective Hardening

Part of a work-piece can be kept soft while the rest is being carburized by the use of a paste known as "Isopac," which has been developed by Denfis Chemical Laboratories, Inc., 172 Pacific St., Brooklyn 2, N. Y. When applied to work that is to be casehardened, this paste prevents the penetration of carbon gas and insulates the protected section to prevent rapid cooling. It is easily removed after the work is quenched. "Isopac" is suitable for use regardless of whether the carburizing medium is a box furnace, atmosphere, or salt bath. 203

New Compound that Speeds Up Hardening of Tools

A steel hardening compound in powder form that can be applied to cutting tools, dies, taps, reamers, drills, and files without special equipment is being manufactured by the Wilson Carbon Co., 60 E. 42nd St., New York 17, N. Y. The compound, designated "Hi-Speed-It," is applied by dipping or rolling the tool in it after the tool has been heated to the required temperature. Quenching is accomplished in cold water or brine. As an example of the rapidity of the

process, a 1 1/2-inch gouge was deep-hardened with the new compound in approximately three minutes.

Carbon steel drills treated with this compound will drill through automobile spring-leaf steel, blue spring steel, and other tough alloy metals. High-speed steel tools can also be hardened with this compound. 204

Primer that is Applicable to Wet or Rusted Metal

The Wilbur & Williams Co., Greenleaf and Leon Sts., Boston 15, Mass., has developed a combination chemical pretreatment and primer for metal, designated "Rust-O-Primer," which eliminates the necessity of having to remove rust from metal parts preparatory to painting and can be used with satisfactory results on surfaces that are not perfectly dry. This product is a vinyl base, quick drying primer, applicable over wet or dry and clean or rusted metal, including steel, aluminum, and galvanized iron. Its purpose is to provide a hard foundation for any type of paint. 205

Room-Temperature Strippers for Organic Finishes

Enthone, Inc., 442 Elm St., New Haven, Conn., has developed two new room-temperature strippers for synthetic enamels. Stripper S-17 is a clear, quick-evaporating stripper for removing all types of synthetic enamels, including heavy coatings of enamels that accumulate on workholders and hooks. Stripper S-19 is similar in its action, and is used for certain special cases where the other stripping compound cannot be used. Both strippers are employed with water seals to minimize evaporating losses, and rinsing is not necessary after their use. 206

Carpenter Stainless Steel Produced in Sheet and Plate Form

Introduced about a year ago in various wrought forms by the Carpenter Steel Co., Union, N. J., a "super corrosion-resistant" steel known as Carpenter Stainless No. 20 is now being commercially produced in sheet and plate form. This material is available in cast form, designated "Durimet 20," from the Duriron Co., Inc., Dayton, Ohio.

Stainless No. 20 sheet steel is produced in standard widths and lengths and in gages from 24 to 11, while the plate steel is made in thicknesses from 3/16 inch up. 207

Corrosion-Resistant Plastic Coating for Industrial Use

A line of corrosion-resistant plastic coatings developed especially for the protection of machinery, processing equipment, and general factory maintenance where corrosives are used has been developed by the Poly-Cyclo Products Co., of Cleveland, Ohio. The coating, termed "Cyc-Lon" (Series NPC), is an inexpensive, easily applied synthetic paint for protecting metals, wood, and ceramic surfaces against chemical attack by corrosive fumes, condensates, etc. "Cyc-Lon" dries quickly in the air by solvent evaporation to an adhesive, hard wearing, flexible glossy coating, and requires no surface priming. . .208

To Obtain Additional Information on Materials of Industry

To obtain additional information about any of the materials described on these pages, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning name of material as described in May, 1949, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

Fill in your name and address on the blank below. Detach and mail within three months of the date of this issue to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

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Drawing and Spinning of Aluminum Alloys

Abstract of a Paper Presented by E. G. Kort, of the Process Development Laboratories, Aluminum Company of America, before the Recent Meeting of the American Society of Tool Engineers at Pittsburgh, Pa.

THE increasing use of aluminum alloys for parts manufactured on a mass production basis has made it desirable, in a large number of cases, to produce such parts by drawing in presses. Many plants familiar with the production of drawn shapes from steel, brass, or other materials are using the same tool designs and press-room techniques for drawing aluminum. Such a procedure has frequently proved adequate, particularly on the simpler drawn parts where good tooling already existed. However, when an aluminum alloy is substituted for steel and severe forming problems are involved, or where multiple draws are required, it is sometimes necessary to modify the sequence as well as the number of operations.

Spinning—one of the oldest of the metalworking arts—has been largely replaced by press forming on large-scale production. Spinning is still a useful process, however, when tool costs must be held to a minimum or when parts cannot be readily press-formed because of size or design. It is often used in combination with drawing for finishing and trimming operations.

Aluminum alloys may be broadly classified into two groups—non-heat-treatable and heat-treatable. The former group comprises alloys whose strengths are governed by the composition and the amount of strain hardening present, while the latter consists of alloys whose properties are determined by the thermal treatments used. Wrought aluminum alloys that are commonly used for drawn and spun shapes include the non-heat-treatable alloys 2S, 3S, 4S, and 52S, and the heat-treatable alloys 14S, 24S, 61S, and 75S. [The temper designations for these and other aluminum alloys are given in Data Sheet Nos. 633 and 634, appearing in this issue of MACHINERY. Typical mechanical properties of the alloys will be given in Data Sheet Nos. 635 and 636, to appear in June MACHINERY.]

In the past, most non-heat-treatable aluminum alloys have been produced by the temper rolled (designated by the H1 suffix) method. This type

Fig. 1. A double-action press is employed for the second drawing operation performed in the production of barrel shells. The drawn shape produced in the first operation is seen at the right

should be specified for initial tool trials unless it is specifically known that the partially annealed (H2) material is preferable, or at least as satisfactory.

In drawing or spinning non-heat-treatable alloys, the temper required in the original blank is governed by the severity of the forming operation. For severe forming and multiple drawing operations, the annealed temper is usually required. Since the material is cold-worked during the drawing and spinning operations, higher mechanical properties can be anticipated in the worked areas of the finished part. The accompanying table shows the effect of multiple drawing on the properties of 3S-O and 52S-O aluminum alloys when producing cylindrical shapes.

Annealing of Aluminum Alloys

In some cases, the part being formed may be so severely worked that it will be subject to breakage upon additional forming. Then the partially formed part must be annealed before subsequent forming. The annealing operation consists of heating the part to a temperature of 650 to 750 degrees F., in order to remove the effects of cold-working and permit recrystallization to take place. The rate of recrystallization increases with the temperature, as well as with the degree of hardness in the metal prior to the annealing operation.

Complete annealing is practically instantaneous for severely worked 2S, 4S, and 52S alloys at temperatures above 650 degrees F., and for 3S at temperatures above 750 degrees F. If the instantaneous annealing temperature has been reached, the temperature is not critical, although it is not desirable to hold the temperatures for excessive lengths of time, as grain growth may occur. If the partially formed part has areas with only a small amount of strain hardening, the annealing operation will often produce areas of relatively large grains. These grains may be detrimental in any subsequent forming operation if the additional working of the metal takes place in the same locality. The rate of cooling is not important, although rapid cooling may produce distortion. Since annealing complicates press-room operations, it is preferable to avoid this operation if the part can be satisfactorily formed either by the use of an extra operation or by some other means.

While natural aging of heat-treatable aluminum alloys occurs rather rapidly at room temperature, the age-hardening effect can be retarded or completely arrested for limited periods if the alloys are held at a low temperature (0 to 32 degrees F.). The aircraft industry takes advantage of this fact in performing difficult forming operations. The material is heat-treated in quantities, and, after quenching, is placed in a container where zero temperatures can be maintained. It is removed from the container, a piece at a time, and formed immediately while it is in the most workable condition. As the formed part warms to room temperature, natural aging progresses at a normal rate.

In the case of some alloys in the heat-treatable

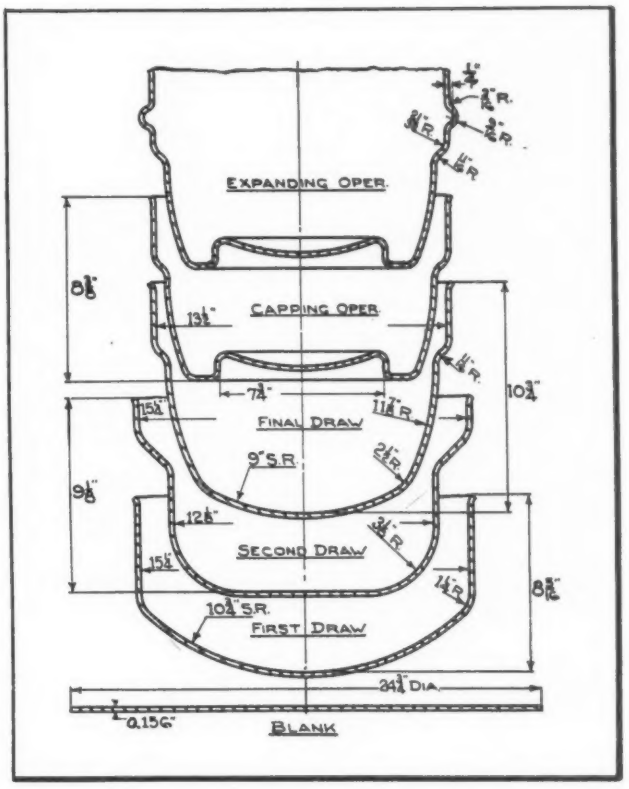


Fig. 2. Operation lay-out for the deep-drawing of a 7¾-gallon beer-barrel shell from the aluminum blank shown at the bottom

Effect of Multiple Drawing on Properties of 3S-O and 52S-O Aluminum Alloys

(Specimens taken from side wall at top of drawn shell)

Aluminum Alloy	Number of Draws	Thickness, Inch	Tensile Strength, Pounds per Square Inch	Per Cent Increase	Yield Strength, Pounds per Square Inch	Elongation, Per Cent in 2 Inches
3S-O	0	0.103	16,000	....	6,000	30 0
	1	0.100	18,700	17.2	16,700	11.0
	2	0.097	22,100	38.4	20,800	9.0
	3	0.097	23,700	48.2	21,900	8.0
	4	0.098	24,200	51.1	22,300	7.5
52S-O	0	0.103	29,200	....	14,200	27.0
	1	0.101	34,400	18.0	31,600	6.0
	2	0.090	39,700	36.2	37,100	5.0
	3	0.087	42,700	46.5	38,600	5.5
	4	0.089	43,800	50.2	39,100	5.0

group, a small amount of cold-working after solution heat-treatment produces an increase in the yield strength, with some improvement in the tensile strength and a small loss in elongation. Even the small amount of strain hardening that results from a flattening or straightening operation after quenching can be detected. The strain hardening that occurs during drawing can also be detected, although the degree will vary, since the metal is worked differently in various areas of the part.

In working with the heat-treatable aluminum alloys, the tool designer has a variety of selections, as far as routine or technique is concerned. Parts of 14S, 24S, 61S, and 75S may be drawn in the "O" temper and subsequently given a solution heat-treatment, although distortion generally occurs during the quenching operation. If the part is restruck in the die, or respun immediately after quenching, it is often possible to remove such distortion.

Where multiple operations are utilized for the production of the shape, and where the last operations are not too severe, it is sometimes feasible to perform the heat-treating operation after the next to the last forming operation. The final operation is thus performed immediately after the solution heat-treatment, which not only brings the part to final shape, but also removes the buckling generated during the quenching operation. In the "O" temper, the alloys will strain harden during forming in a manner similar to the non-heat-treatable alloys. This strain hardening may be removed, if necessary for additional working, by annealing in a manner similar to that described for the non-heat-treatable alloys.

Since the 61S alloy does not age naturally at a very rapid rate, many jobs can be set up so that the drawing or spinning operation is performed within a few hours after the heat-treating operation. This procedure simplifies production problems, since refrigeration can be eliminated. If the material is inadvertently held beyond the period of maximum workability, it can be heat-treated again. In a limited degree, this procedure can be applied to 75S parts.

If maximum properties are desired, 14S, 61S, and 75S aluminum alloys must be artificially aged after completion of the forming and solution heat-treating operations. Artificial aging does not produce distortion in the finished part, since the metal is not heated to high temperatures and cools slowly to room temperature.

Equipment Employed in Drawing Aluminum

Presses used in drawing other metals can be used to produce aluminum parts. The selection of the type, size, and capacity of the press is

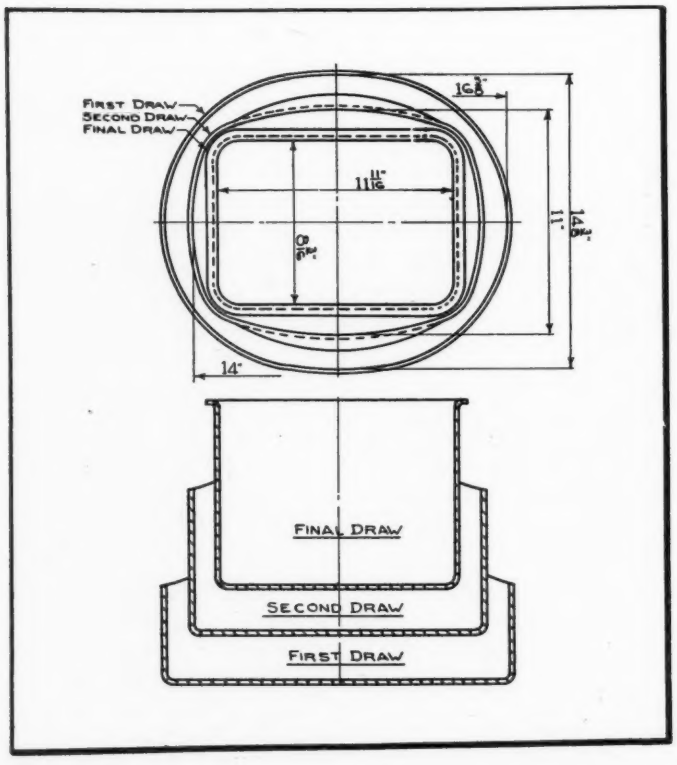


Fig. 3. Sequence of operations employed in drawing a deep rectangular shape from 3S aluminum alloy. The elliptical shape of the initial draws aids metal flow

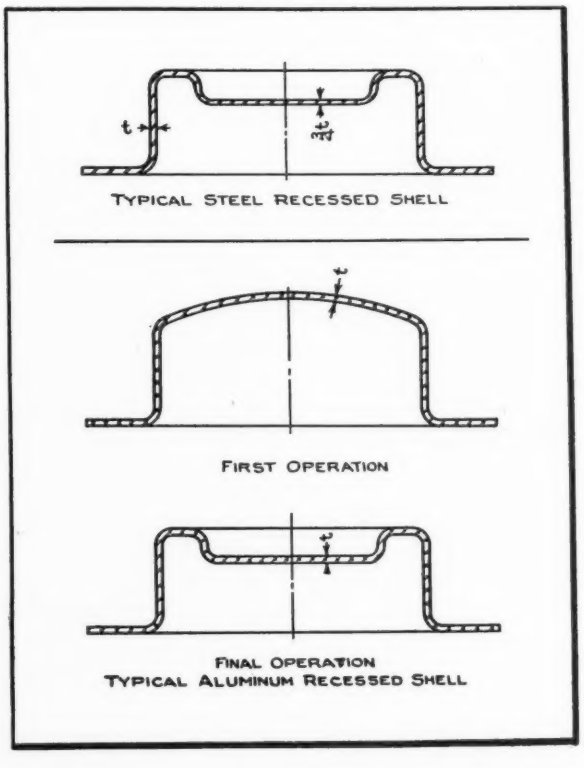


Fig. 4. Steel shells can be formed and recessed in one operation, as seen at top, by stretching recessed portion. Aluminum shells should be recessed in a second operation, as shown below

Fig. 5. Final drawing operation performed on an aluminum-alloy barrel shell. Metal is "positioned" in the head of the shell to permit subsequent recessing

influenced by factors such as the diameter and thickness of the blank, the shape and depth of the drawn part, and the alloy and temper of the material. A double-action press is usually preferred for complicated draws, since it provides positive control of the metal as it passes between the blank-holder and the die.

Fig. 1 shows the second drawing operation on on a 7 3/4-gallon aluminum beer-barrel shell in a double-action press, and Fig. 2 illustrates diagrammatically the complete operation breakdown. In considering the use of a single-action press with a blank-holder actuated by an air cushion or spring pad, it is well to remember that the pressure exerted by the air cushion or spring pad lowers the total available pressure exerted by the ram of the press.

Design of Tools for Drawing Aluminum

The design of drawing tools for aluminum alloys is an important factor in obtaining acceptable parts. The general principles of design are much the same as those for other metals, with a few exceptions. The amount of reduction per drawing, the tool radii, and the changes in the metal thickness are the main points for a tool designer to consider in attempting to utilize past experience with other metals.

In calculating the maximum permissible eco-

Fig. 6. Aluminum barrel shell heads are recessed in a "capping" operation performed on a double-action press

nomical reduction in diameter per drawing for deep-drawn shells, the table below will be found helpful. This table provides safe values for the aluminum alloys drawn in the annealed (O) temper. Alloys that tend to cold-work more rapidly, such as 52S, should be based on the lower values. There are cases where these values have been exceeded, but the loss due to fracturing can easily exceed the savings made in eliminating an operation. For intermediate tempers, the values shown must be reduced, depending on the temper of the starting blank.

Operation	Economical Permissible Reduction
Blanking	....
First Drawing (D_1)	0.40D* to 0.42D
Second Drawing (D_2)	0.20D_1 to 0.25D_1
Third Drawing (D_3)	0.15D_2 to 0.18D_2
Fourth Drawing (D_4)	0.15D_3

*D = diameter of blank.

In drawing, the radius of the die should not be less than four times the thickness of the blank, nor more than fifteen times this thickness. The radius on the punch should be held to a minimum of four times the thickness of the blank. If a small radius is required in the finished part, a restriking operation should be used. A small die radius increases the resistance to flow of the metal, which will tend to cause fracture during the operation.

On the other hand, if the die radius is made too large there is a tendency to lose control of the metal as it flows between the blank-holder and the die, which produces wrinkles. A liberal radius at the corners of rectangular and odd-shaped shells is advisable, since this improves the metal flow at these critical zones.

Fig. 7. Drawn and recessed barrel shells are trimmed on a spinning lathe equipped with a cast-iron chuck and a diamond-pointed tool

Suggested tool clearances for drawing cylindrical shapes of aluminum alloys are as follows:

Drawing Operation	Clearance
First	Punch diam. + 2.2 × thickness of blank
Second	Punch diam. + 2.3 × thickness of blank
Third and succeeding	Punch diam. + 2.4 × thickness of blank
Final (of tapered shells)	Punch diam. + 2.0 × thickness of blank

Similar tool clearances suggested for drawing rectangular shapes are as follows:

Drawing Operation	Clearance
First	Punch diameter + 2.2 × thickness of blank
Second	Punch diameter + 2.2 × thickness of blank
Final	Punch diameter + 2.0 × thickness of blank

On final drawing of both rectangular and tapered cylindrical shapes, it will be noted that the clearance is equal to just twice the metal thickness. This involves some "easing" during try-out, but this practice will minimize waves in the walls of the finished shells.

In designing tools for aluminum alloys, it should be remembered that the metal must be allowed to flow easily. The die radius, corner radii on odd and rectangular shells, and the blank-holder pressure are some of the factors to consider in allowing for metal flow. Fig. 3 shows the operations used in producing a rectangular shell from 3S aluminum alloy. The shape of the first two draws tended to be elliptical, which aided in the problem of metal flow.

A practice commonly employed for forming some metals into final shape by stretching will usually cause failure if tried on aluminum alloys. The top view in Fig. 4 shows a typical steel recessed shell, where the part has been produced in one operation and the recess formed by stretching. This process thins the metal to about 75 per cent of the original blank thickness.

The lower views in the illustration show a satisfactory method of producing the same shell from an aluminum alloy in two operations. It will be noted that the metal is "positioned" in the first draw, so that it can be displaced in the final operation to form the recess. The thickness of the metal in the recess remains about the same as the thickness of the original blank.

Fig. 5 shows the final drawing operation on the aluminum-alloy beer-barrel shell (seen being

Fig. 8. Section of a large tank head spun from a 3S-O aluminum alloy blank, 1⅜ inches thick. The flanged openings were produced on a press after spinning

drawn in Fig. 1). The metal is "positioned" in the head to permit forming the recess in a subsequent "capping" operation, Fig. 6.

In drawing thin sheets, as well as in spinning, there is a tendency for buckles to form around the periphery of the blank. Some type of blankholder must be used in drawing operations to prevent this. Buckles or wrinkles will promote breakage in later stages of the operation by offering resistance to the flow of the metal. With some metals, it is possible to "iron out" the buckles in a subsequent operation, but such a procedure is seldom successful with aluminum alloys.

Tools for drawing aluminum alloys can be made of cast iron, alloy cast iron, carbon steel, alloy tool steel, or tungsten carbide. For small production runs, Kirksite, Masonite, hard wood, or other inexpensive tool materials have been used to a limited degree. The selection of material depends on the shape to be drawn, the quantity involved, and the finish desired. Porosity in the tool material will produce a poor finish on the shell. The tools should have a high polish, since any roughness or defects will retard the flow of the metal, as well as scar and mark the parts.

Cast iron has been used for drawing tools where tool costs must be held to a minimum and where some scratches on the resultng part are not objectionable. If the completed part is to be polished, the extra finishing cost may well justify the use of a better tool material. Alloy cast iron is used where the job requires a better finish than can be obtained with cast-iron tools, but where, at the same time, the cost of tooling must be held to a minimum.

Alloy tool steels are recommended for aluminum drawing tools if the quantity of parts to be produced is sufficient to justify the cost. These steels are particularly satisfactory for handling the harder alloys of aluminum. Regular carbon steel is a usable tool material, intermediate in cost and performance between alloy cast iron and alloy tool steel. Cemented carbide inserts can be used where production conditions demand a material that will withstand wear.

Equipment Required for Spinning

Simple spinning operations are performed on lathes similar to those employed for woodworking, but of heavier construction. A larger headstock is required because of the heavy pressure exerted. On large spinnings, or for complicated shapes, special spinning devices can be designed. Tools employed for spinning aluminum do not differ materially from those used for other common metals.

Chucks for spinning can be made of hard wood, Masonite, aluminum, cast iron, alloy cast iron, or carbon steel. As the need for a spinning operation is often dictated by the small number of parts required, it is not unusual to find the chucks made in the most economical manner. When small-quantity production is repetitive, the chucks are made of metal. If inside finish is important, a porosity-free material is desirable for the chuck. Sectional chucks, which are constructed so that the removal of one section permits the removal of the remaining segments, are best made of metal. Fig. 7 shows the trimming operation on the barrel shells performed on a spinning lathe, utilizing a diamond-pointed tool and a cast-iron chuck.

Forming tools employed for spinning depend to some degree upon the operator, since each craftsman tends to develop a set of tools that he prefers. Three general types of tools are used. They consist of a tool for forming the metal against the chuck; a tool for beading; and a tool for cutting and trimming. The tool used for forming the metal is sometimes a plain, round-ended, hickory stick, although some spinners prefer to use a half-round, all-purpose steel tool. The upper part of the steel tool is round, and the bottom is slightly crowned so that it can be used for both forming and planishing.

Beading tools may be of the wheel type or they may be sharp-nosed. A diamond-shaped tool is used for cutting and trimming. Steel tools are usually made of high-carbon steel and are forged to shape, hardened, polished, and fitted to a hard wood handle.

When mechanical spinning is utilized, the tools are manipulated by a suitable mechanism. A backing roll may be used to eliminate a chuck or reduce the size of chuck required. On simple jobs, where close tolerances are not important, the shape may sometimes be spun on "air" without resorting to either a chuck or a backing roll. Fig. 8 shows a section of a large tank head spun from a 3S-O aluminum alloy blank, 1 3/8 inches thick. The flanged openings were produced on a press after spinning.

Lubricants Used in Drawing and Spinning Operations

Lubrication performs a vital function in both the drawing and spinning of aluminum alloys. The lubricant used can often mean the difference between success and failure in producing satisfactory shapes. The following table gives the various types of lubricants that have proved satisfactory for drawing aluminum alloys in actual plant operations. As other types of lubricants have been found equally satisfactory, this table should be considered only as a guide in the selection of a possible lubricant.

In general, mineral oils or compounded mineral oils have been used chiefly for drawing aluminum alloys. Water-soluble lubricants have met with a limited degree of success. In many cases, a water-soluble lubricant produces a satisfactory drawn shape, but the lubricant tends to attack the aluminum if not removed from the part in a short time.

Nature of Drawing Operation	Type of Lubricant
Light	Light Lubricating Oil
Medium	Medium Lubricating Oil
Severe	Heavy Lubricating Oil or Mixture of 50 Per Cent Mutton Tallow and 50 Per Cent Paraffin
Extremely Severe	Mixture 30 Per Cent Mutton Tallow and 70 Per Cent Paraffin

In choosing a lubricant, two main points must be considered—first, whether it will perform properly in the drawing operation, and second, whether it can be removed from the metal economically. A lubricant that does an excellent drawing job is of little use if it cannot be removed in a practical manner in the shop. The proper choice of a lubricant is a matter of experience, and varies in different plants, depending on the tool design, the tool material, the metal thickness, the particular aluminum alloy, and other factors.

For spinning, the choice of lubricant is less critical than for drawing. However, some type of lubricant must be used in order to avoid scarring the surface. Beeswax, tallow, and petroleum jelly have all been used for small spun shapes of thin metal. Where thicker blanks are necessary, ordinary yellow naphtha laundry soap has proved satisfactory.

* * *

National Machine Tool Builders Announce Summer Sales Engineering Courses

Four summer sales conferences, designed expressly as refresher courses in sales engineering for the machine tool industry, are announced by the National Machine Tool Builders' Association, in cooperation with Cornell University, Western Reserve University, Dartmouth College, and Purdue University. The conferences are an expansion of the program started last year, when a single course, limited to fifty men, was presented at Cornell University in July. It was the first course of its kind ever devoted exclusively to the sale of capital goods equipment. As last year, the National Machine Tool Builders' Association and the American Machine Tool Distributors' Association have each named a committee jointly to develop the program, which is to be the same at each conference.

Each conference will last five and a half days, beginning on Monday morning and ending Saturday noon. The dates and locations are as follows: Cornell University, Ithaca, N. Y., July 11 to 16; Western Reserve University, Cleveland, Ohio, July 25 to 30; Dartmouth College, Hanover, N. H., August 8 to 13; and Purdue University, Lafayette, Ind., August 15 to 20. The conferences are open only to sales managers, district managers, and salesmen who are employes of members of the National Machine Tool Builders' Association or the American Machine Tool Distributors' Association.

The curriculum will be based on the lectures, problems, and discussions of last year's course at Cornell and on a text-book which is being published at this time by Professor Harry J. Loberg, who is in charge of the conferences. Professor Loberg is head of the Industrial and Administrative Engineering Department of the College of Engineering at Cornell. A faculty of resident professors will be selected at each of the host universities.

Calculating Helix Angles of Gears

A NUMBER of readers have expressed interest in the problem of calculating the helix angles of a pair of helical gears having shafts at right angles and an exact center distance that appeared on page 203 of the February number of MACHINERY.

In that problem, center distance $C = 4.132$ inches; normal diametral pitch $P_n = 8$; number of teeth n in small gear $= 13$; number of teeth N in large gear $= 36$; and ratio $N \div n = 2.76923$.

Minimum Center Distance Can be Computed Directly

Carl A. Johnson of Springfield, Mass., says: "The Editor suggested a trial-and-error method which revealed that a solution was impossible. The writer wishes to suggest a direct method of determining the minimum center distance at which this pair of gears will operate.

"The cube root of the ratio $N \div n$ is the cotangent of the helix angle of a gear and lead angle of a pinion which will operate together at right angles and minimum center distance. Thus,

$$\sqrt[3]{\frac{36}{13}} = 1.404278 = \cot 35^\circ\ 27'\ 18''$$

$$C = \left(\frac{13}{8} \operatorname{cosec} 35^\circ\ 27'\ 18'' + \frac{36}{8} \sec 35^\circ\ 27'\ 18''\right) \div 2$$

$$C = \left(\frac{13}{8} \times 1.72395 + \frac{36}{8} \times 1.22764\right) \div 2$$

$$= 4.1629 \text{ inches}$$

"Since the minimum center distance obtained is greater than that specified, a solution is impossible with the given conditions."

Graphical Solution Suggested

H. B. Schell of Brooklyn, N. Y., writes: "Under the stated circumstances, the fixed center distance results in an indeterminate equation. Buckingham, in Volume 3 of 'Manual of Gear Design,' gives a graphical method, attributing it to Olsen, for solving such problems. For a complete explanation, J. R. H. is referred to that work, beginning on page 138. This solution is shown in the accompanying diagram, Fig. 1."

In this particular case, two circles are drawn to scale to represent the pitch diameters of two corresponding spur gears (spur gears having the same numbers of teeth and pitch as the helical gears) at the specified center distance. Two straight lines are drawn on tracing paper, at 90 degrees with each other (representing the angle of the shafts) and an attempt is made to locate them so that each is tangent to one of the circles and their point of intersection lies on the common center line of the circles. As Mr. Schell points out: "The conditions apparently cannot be met by any combination of spiral (helix) angles, since the intersection of the 90-degree lines cannot be made to fall on the center line."

Mr. Schell then goes on to suggest that a 35-tooth gear be used in place of the 36-tooth gear, but having the same normal diametral pitch. The pitch radius of a 35-tooth, 8-pitch spur gear would be 2.1875 inches. A circle representing this gear is also shown in Fig. 1, and it will be noted that the intersection of the 90-degree dotted lines, which are tangent to the 35-tooth and 13-tooth spur gear pitch circles, can now be made to fall on the center line.

The distance from the center of the small cir-

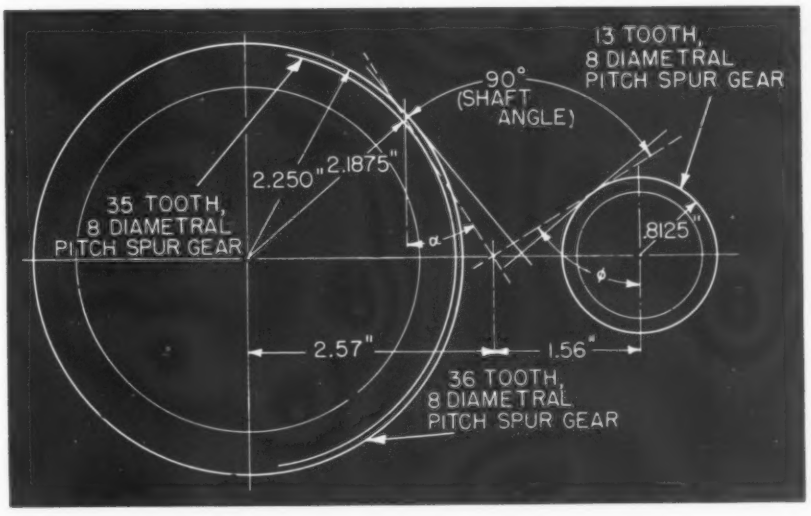


Fig. 1. Graphical method of determining helix angles of a pair of helical gears when center distance, normal diametral pitch, and number of teeth in each gear are known

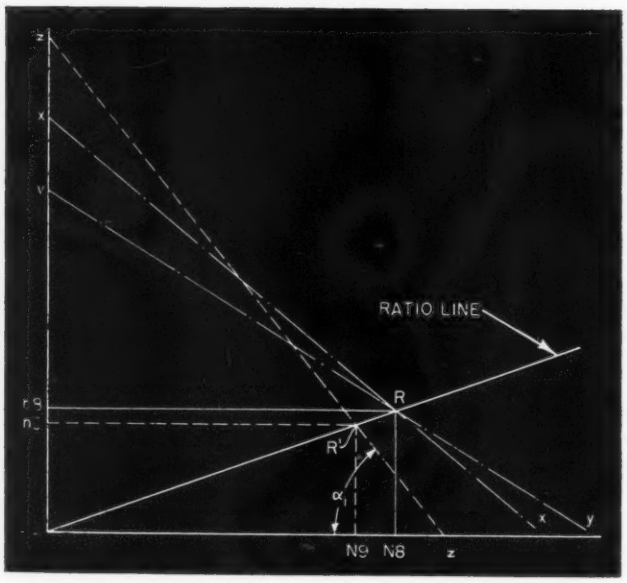


Fig. 2. Another graphical method of determining helix angles of a pair of helical gears

cle to the intersection of the two lines on the center line represents the pitch radius of the 13-tooth helical gear. The pitch radius of the 35-tooth helical gear is scaled from the center of the large circle to the same point. When measured, these radii are found to be 1.56 inches and 2.57 inches, respectively. The helix angle a of the large gear and the helix angle ϕ of the small gear are then computed. In each case, the cosine of the helix angle is equal to the pitch radius of the corresponding spur gear divided by the pitch radius of the helical gear:

$$\cos a = \frac{2.1875}{2.57} = 0.85116 \text{ and } a = 31^\circ\ 40'$$

$$\cos \phi = \frac{0.8125}{1.56} = 0.52083 \text{ and } \phi = 58^\circ\ 37'$$

Since the sum of these two helix angles is 17 minutes greater than 90 degrees, this 17 minutes is subtracted from the smaller helix angle, where it will have the least effect on the pitch diameter, or

$$31^\circ\ 40' - 17' = 31^\circ\ 23'$$

and

$$\cos 31^\circ\ 23' = 0.85370$$

The new pitch radius R of the larger helical gear is now equal to the pitch radius of the corresponding spur gear divided by the cosine of the modified helix angle, or

$$R = \frac{2.1875}{0.8537} = 2.562 \text{ inches}$$

Then the pitch radius of the large gear plus the pitch radius of the small gear $(R + r) = 2.562 + 1.560 = 4.122$ inches, which should be close enough to the specified center distance. In commenting on this, Mr. Schell says: "If 8 normal diametral pitch gears must be used, this would seem to be the easiest solution. Incidentally, the ratio of 13/36 is 0.36111 and that of 13/35 is 0.37143. However, if 10 normal diametral pitch gears can be used, the 13/36 combination will admit of a solution.

"Possibly, with the altered conditions, the problem can be solved analytically by the method given in MACHINERY'S HANDBOOK. However, this graphical method is so easily and quickly applied that it should be better known."

Another Graphical Solution

Sherwood C. Bliss of Kenmore, N. Y., writes that the method for calculating the helix angles of gears given on page 203 in the Questions and Answers section of February MACHINERY recalled a modification of an old method that he has used for many years for the same purpose. By his method of solving this particular problem, the first step is to lay off the pitch diameter of an 8 diametral pitch, 13-tooth spur gear to scale on a vertical line. This is shown as distance *A–n*8 in Fig. 2. Similarly, the pitch diameter of an 8 diametral pitch, 36-tooth spur gear is laid off to scale on a horizontal line. This is distance *A–N*8.

Point *R* is the intersection of a horizontal line drawn through point *n*8 and a vertical line drawn through point *N*8. Twice the given center distance, 2*C*, is laid off to scale on the edge of a piece of paper and a pin is placed through point *R*.

With the edge of the paper against the pin, an attempt is made to place one end of the marked distance 2*C* on the vertical line and the other end on the horizontal line. When this is attempted, it is found that with one end of distance 2*C* on the vertical line, the other does not reach to the horizontal line, as indicated by lines *x–x* and *y–y* in Fig. 2. This shows at once that the proposed pitch of the gears is too large.

The diagram is now reconstructed for 9 diametral pitch gears of 13 and 36 teeth with lines *A–n*9 and *A–N*9, and a new "pivot point" *R'* established. Again, using the same distance 2*C* as laid out on the edge of a piece of paper, it is found that line *z–z* can be established equal to 2*C*, or 8.264 inches.

The angle a_1 represents the helix angle of the larger gear. When measured with a protractor, this angle is found to be approximately 51 degrees 20 minutes. Using this measured angle, the corresponding center distance C_1 is computed by the following formula:

$$C_1 = \frac{N \sec a_1 + n \operatorname{cosec} a_1}{2P_n}$$

$$C_1 = \frac{36 \times 1.6005 + 13 \times 1.2807}{2 \times 9} = 4.126 \text{ inches}$$

Since this is less than the required center distance C, a slightly larger helix angle a_2, say 51 degrees 30 minutes, is assumed and the corresponding center distance C_2 is computed by the following formula:

$$C_2 = \frac{N \sec a_2 + n \operatorname{cosec} a_2}{2P_n}$$

$$C_2 = \frac{36 \times 1.6064 + 13 \times 1.2778}{2 \times 9} = 4.136 \text{ inches}$$

This center distance is slightly greater than the given center distance C. Hence, the correct helix angle a lies between a_1 and a_2 and can be found by interpolation.

$$\text{Thus } a = a_1 + (a_2 - a_1)\left(\frac{C - C_1}{C_2 - C_1}\right)$$

$$a = 51^\circ\ 20' + (51^\circ\ 30' - 51^\circ\ 20') \frac{4.132 - 4.126}{4.136 - 4.126}$$

$$a = 51^\circ\ 20' + 10' \times 6/10 = 51^\circ\ 20' + 6' = 51^\circ\ 26'$$

The helix angle of the smaller gear is then equal to $90^\circ - a = 90^\circ - 51^\circ\ 26' = 38^\circ\ 34'$.

George Gorton Machine Co. Awards Engineering Scholarship

Announcement has been made that the George Gorton Scholarship in Mechanical Engineering has been granted to David A. Dixon, 442 Wolff St., Racine, Wis., a senior at the William Horlick High School and the first high-school student to receive the award. The scholarship was established in the fall of 1948 by the George Gorton Machine Co., Racine, Wis., with the objects of providing an opportunity for young men to pursue a college engineering program and of assuring a supply of competent mechanical engineers. Young Dixon has registered at the University of Illinois, one of the five universities that agreed to cooperate with the George Gorton Machine Co. by admitting the winner, regardless of waiting lists. The other universities are Purdue University, Northwestern University, Marquette University, and the University of Wisconsin.

A stipulation of the scholarship is that the candidate shall spend a specified period of practical experience with the George Gorton Machine Co., thus receiving valuable industrial training, as well as wages to supplement the award.

* * *

The steel industry uses over two billion gallons of fuel oil annually.

Plastic sleeves that insure permanent identification of tubing, wires, cables, hose, conduits, couplings, etc., are a product of the Topflight Tape Co., York, Pa. These sleeves, which are only 0.013 inch thick, are available with desired printing hot-stamped into the plastic material. The illustration shows sleeves of this type being applied to airplane tubing in the plant of the Glenn L. Martin Co.

Controlling Temperature in Hot

MANY of the problems arising in hot metal-working operations, such as crimping, heading, and collapsing of thin-wall tubes, can be overcome successfully by the method here described. Pressure is applied to the work by dies operated through an automatically controlled air circuit. The air circuit is interconnected with a photo-electric temperature-control unit and a source of electrical power for heating the work. Flanges were crimped around the peripheries of tubular parts in this way, as shown in Fig. 1, at high production rates by unskilled operators.

To make these parts economically, a generous allowance was specified for the variation in wall thickness of the purchased tubing. As a result, with previous methods of crimping, where heat was applied for a fixed length of time, the walls of certain parts were burned through because of overheating, while others fractured because they were subjected to compression before they were sufficiently heated.

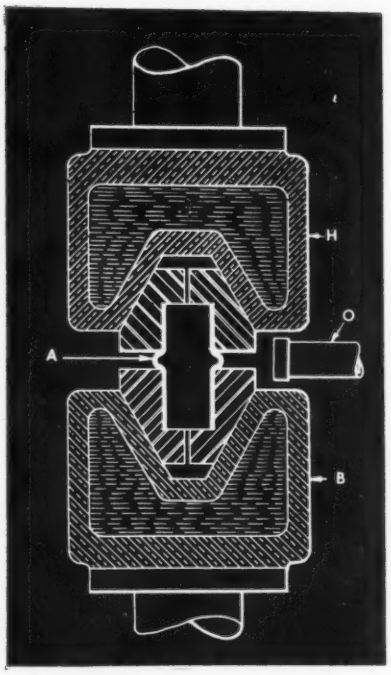


Fig. 1. Tubular part (A) is effectively crimped around its periphery, regardless of variation in wall thickness, by means of the set-up shown in Fig. 2

By installing a photo-electric temperature-control unit in the circuit, every part can be heated to the same temperature regardless of differences in the wall thickness. The control unit breaks the circuit carrying heat producing current to the part when a pre-set temperature has been reached. The heating cycle will, therefore, be shorter for thin-walled parts and longer for thicker sec-

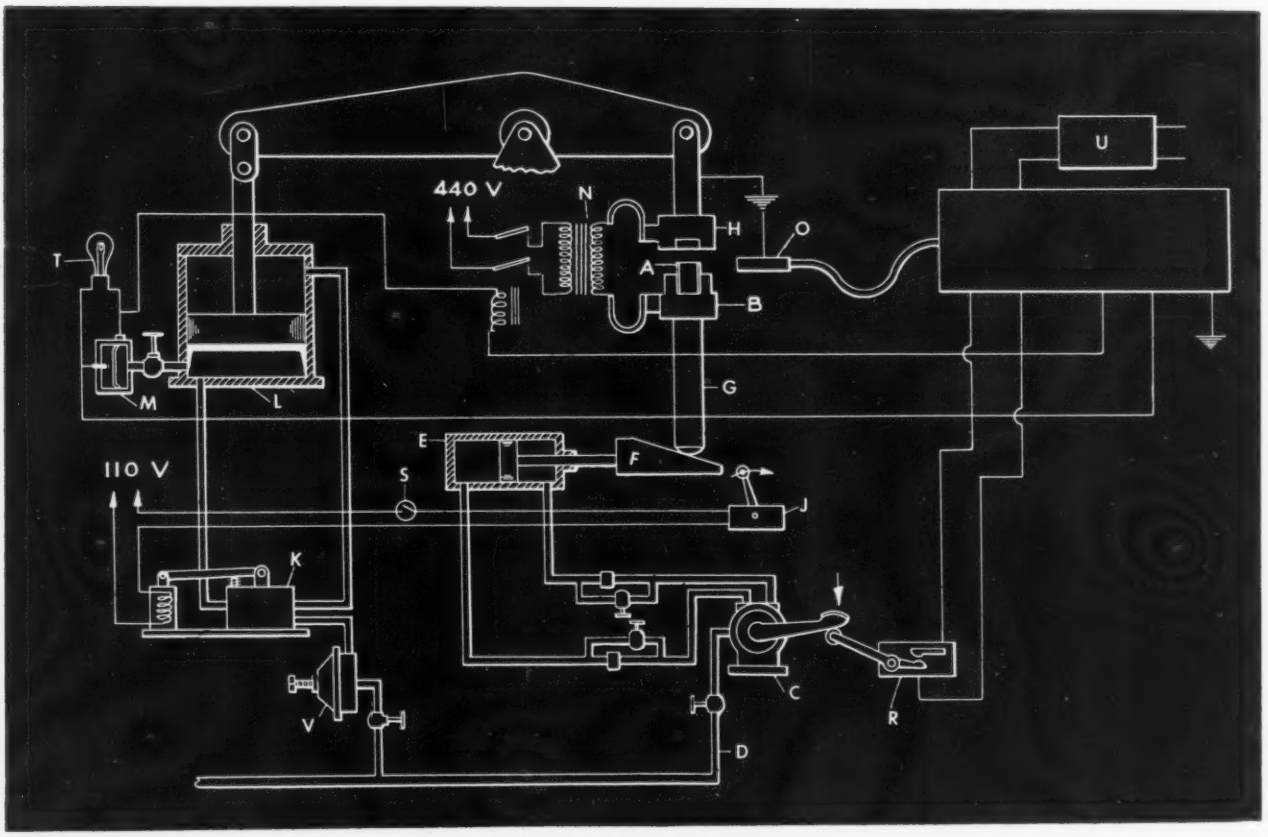


Fig. 2. Method of hot-forming tubular parts. Work-piece (A) is heated and compressed between dies (H) and (B). A photo-electric control unit (O) regulates the temperature to which the part is heated

tions, but each piece will be brought to the correct crimping temperature.

A typical lay-out employed for this method of hot-forming tubular parts is shown in Fig. 2. The part *A* to be formed is placed in lower die *B*. When the foot-treadle on valve *C* is depressed, air from supply line *D* enters the left-hand end of cylinder *E*. Cam *F* is thereby moved to the right, raising the lower die by means of ram *G*. Continued travel of the cam in this direction actuates limit switch *J*, which energizes a solenoid-operated air valve *K*. Air is thus admitted to the bottom of cylinder *L*, applying a downward pressure stroke to die *H* through a lever arm and fulcrum. By the proper design of cam *F* to suit the length of the part, travel of the upper die can be held to a minimum, thus conserving air and resulting in a squeezing action on the work rather than an impact blow.

Movement of the foot-treadle on valve *C* also actuates limit switch *R* for energizing and de-energizing the photo-electric temperature-control unit *O*. When air entering the bottom of cylinder *L* reaches a pre-set pressure, switch *M* operates a relay that controls a low-voltage, high-amperage transformer *N* to supply current for resistance heating of the part to be formed.

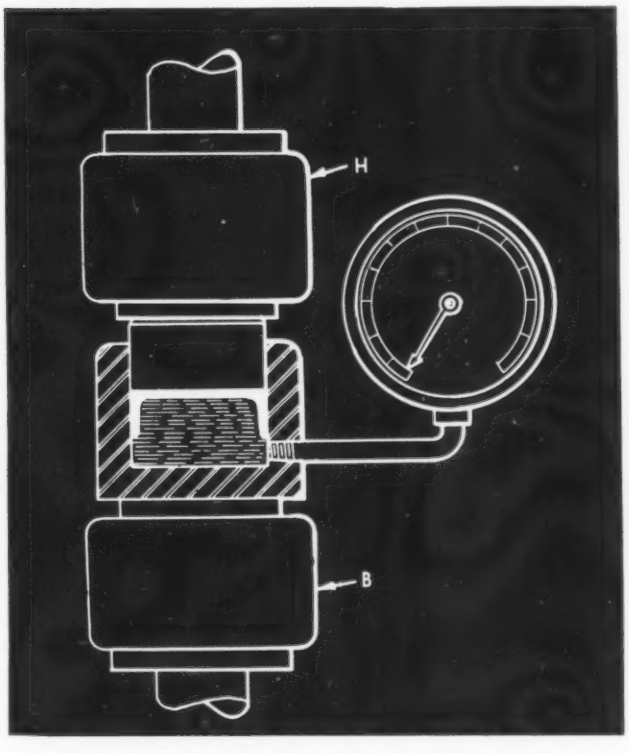


Fig. 3. Pressure exerted by dies (H) and (B) can be determined by placing a master cylinder and piston of known area between the dies

When the part has been heated to the proper forming temperature, the photo-electric control unit de-energizes the transformer relay and breaks the current supply circuit when the forming cycle has been completed.

As soon as the foot-valve is released, the stroke of the piston in cylinder *E* is reversed, moving cam *F* to the left. This returns the lower die to its starting position. Simultaneously, limit switch *J* is automatically opened to de-energize the solenoid-operated air valve *K*. Air is thus admitted to the top of cylinder *L*, returning upper die *H* to its original location.

Check-valves are placed in the air line between valve *C* and cylinder *E* to permit controlling the speed of the lower die travel. A slow advance is desirable during the pressure stroke for smooth operation, and a fast return speeds production. Regulator *V* is employed to adjust the air pressure acting indirectly on the upper die.

Direct readings of the pressure being exerted by the dies can be made by inserting a master cylinder and piston of known area between the dies, as seen in Fig. 3. The electrical circuit can be broken by means of switch *S*, so that the pressure calibration will be made with the air circuit only. A "tell-tale" lamp *T* can be connected to the electrical circuit to indicate when pressure switch *M* is closed. Because of the sensitivity of the photo-electric control unit, it is necessary to employ a voltage regulator *U* at the source of current for this unit. Also, the use of a filter glass is recommended for the electric eye to offset the effects of sunlight or factory illumination.

* * *

Fastener Manufacturers Study Unified Screw Threads

American - British - Canadian Unified Screw Threads as applied to fasteners such as bolts, screws, and nuts is the subject of a book just published by the American Institute of Bolt, Nut, and Rivet Manufacturers, 1550 Hanna Bldg., Cleveland, Ohio, which is available at $1.50 per copy. This 100-page book contains the proceedings of a fastener manufacturers' symposium, consisting of thirteen papers that cover the background of international agreement on the screw thread standard, description and analysis of the new standard, and discussion of its effect on fastener manufacture.

Questions and Answers

A Department in which the Readers of MACHINERY are Given an Opportunity to Exchange Information on Questions Pertaining to the Machine Industries

How Can Jamming of Stock in Progressive Dies be Eliminated?

F. E. D.—We are experiencing difficulty in feeding coiled stock through a progressive die because of the tendency of the stock to jam between the guides. Before starting the press, the stock can be readily fed through the die between the guides, but when the press is in operation, the stock frequently becomes jammed. Any suggestion as to how this difficulty can be eliminated would be greatly appreciated.

Answered by Cliff Bossmann
Tool Design Department
National Cash Register Co., Dayton, Ohio

It will probably be found that the width of the stock is increased slightly as each stage of the die performs its respective operation, so that the stock will be noticeably wider when it reaches the last stage, where the actual jamming probably occurs. This condition could be eliminated by tapering the stock guides slightly, so that the distance between them at the finish end is greater than at the starting end by an amount sufficient to allow the expanded stock to pass through.

Another solution might be found in the use of one fixed stock guide and a spring-backed stock guide designed to keep one edge of the stock in contact with the fixed guide while compensating for any variation in the width of the stock. A guide of the latter type is described and illustrated in MACHINERY'S book, "Die Design and Diemaking Practice," page 211.

Payment to Authorized Person

K. W. Y.—Recently we paid $850 to a person by the name of Carter for a machine purchased from a seller named White. Now White is suing us for this amount. Can he collect?

Answered by Leo T. Parker, Attorney at Law
Cincinnati, Ohio

According to a recent higher court decision, a purchaser of merchandise can pay either the seller or any person the seller authorizes. For example, in Macbeth vs. West Coast Packing Corp. [187 Pac. (2d) 815], the testimony showed that a concern sold certain machinery with accessories to the West Coast Packing Corporation for the sum of $4500. At the time the goods were delivered, the purchaser paid $500 down to the seller. Later the seller, in writing, assigned $1000 of the $4000 due to a creditor. The buyer paid the $1000 to the creditor. Later the seller sued the purchaser to collect the full $4000.

The higher court held that the purchaser owed only the difference between the $4000 and the $1000 he had paid the seller's creditor. In other words, the court held that the purchaser was safe from future suits by the seller, who had given a written order authorizing the purchaser to pay a part of the contract price to a designated person. On the other hand, if you paid $850 to Carter without authorization, and Carter did not pay this money to White, Carter is responsible, and you must pay $850 to White.

* * *

Iron and Steel Products Protected by Treated Kraft Paper

A treated Kraft paper known as "Nox-Rust Vapor" has been brought out by the Nox-Rust Chemical Corporation, 2419 S. Halsted St., Chicago 8, Ill., to provide iron and steel products with protection from corrosion while being shipped or in storage. The chemical with which the paper is treated slowly evaporates and covers every surface of the ferrous metal, preventing corrosive action of both moisture and air. The wrapper need not be sealed or even tightly wrapped to give this protection, nor is it necessary for it to come into contact with the part. Any moisture within the package combines with the chemical vapor.

The wrapper is an essentially neutral paper, and the vapor arising from it is odorless, nontoxic, and non-injurious to the skin. The chemical is stable, and is not consumed in preventing corrosion. It has little tendency to escape even when not sealed. This protective wrapper can be used for such parts as saw blades, bearings, piston-rings and sleeves, mechanics' tools, files, cutting tools, sheet steel, bar steel, and a variety of other steel products of similar nature.

Tool Engineering Ideas

Tools and Fixtures of Unusual Design, and Time- and Labor-Saving Methods that Have been Found Useful by Men Engaged in Tool Design and Shop Work

Fixture for Holding Thin-Walled Castings in a Lathe

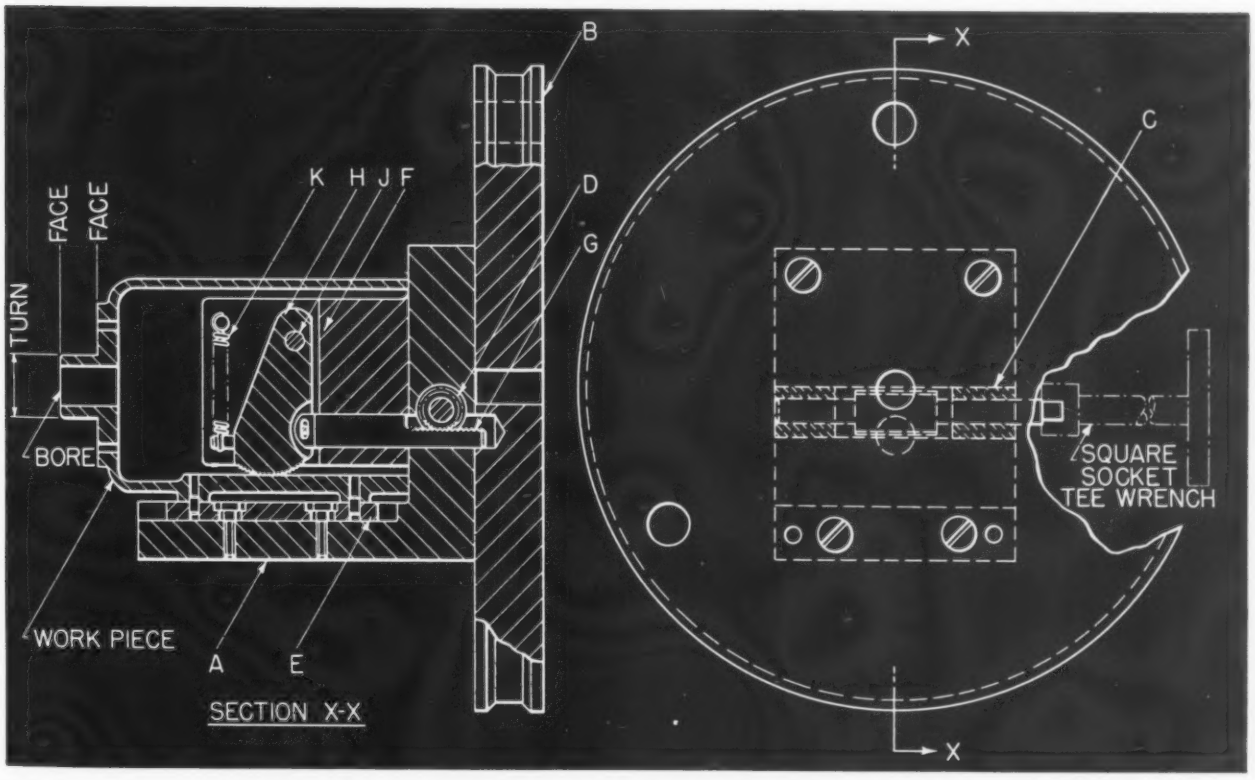
By FRANK J. PERAGINE, South Hempstead, N. Y.

In order to hold a thin-walled casting for facing, turning, and boring in a lathe, the fixture shown in the accompanying illustration was designed. Ordinary clamping and holding devices were not practical, because distortion was likely to take place due to the thin-walled design of the part.

The fixture consists of an angle-plate *A*, mounted on a lathe faceplate *B*. A bored hole in the angle-plate contains bushings *C*, which support a pinion *D*. One end of the pinion-shaft is of square cross-section for engagement with a wrench, as indicated in the end view of the illustration. A locating slide *E* is secured to the angle-plate by means of socket-head cap-screws in elongated holes. Locating pins in the slide engage holes in the work-piece for aligning it.

A block *F*, mounted on the angle-plate, is bored to receive the cam-actuating member *G*, which has gear teeth at one end that engage teeth in the pinion. The opposite end of this member is linked to cam *H*. The cam is free to pivot on dowel *J*, which secures it to the cam-block. One end of spring *K* is fastened to the cam-block, and the other end is attached to the cam for the purpose of raising it when loading and unloading the fixture.

After a casting has been placed on the locating pins in the fixture, turning the pinion by means of the square-socket wrench actuates the cam so that it grips the bottom inside surface of the work. This provides a downward clamping force, the sawtooth contour of the cam face preventing slippage of the work during the performance of the various operations. Releasing the cam pressure through the medium of the pinion and rack permits the spring to hold the cam out of the way while removing the finished work and loading another part.



Thin-walled casting securely clamped in a lathe fixture by means of positive cam action

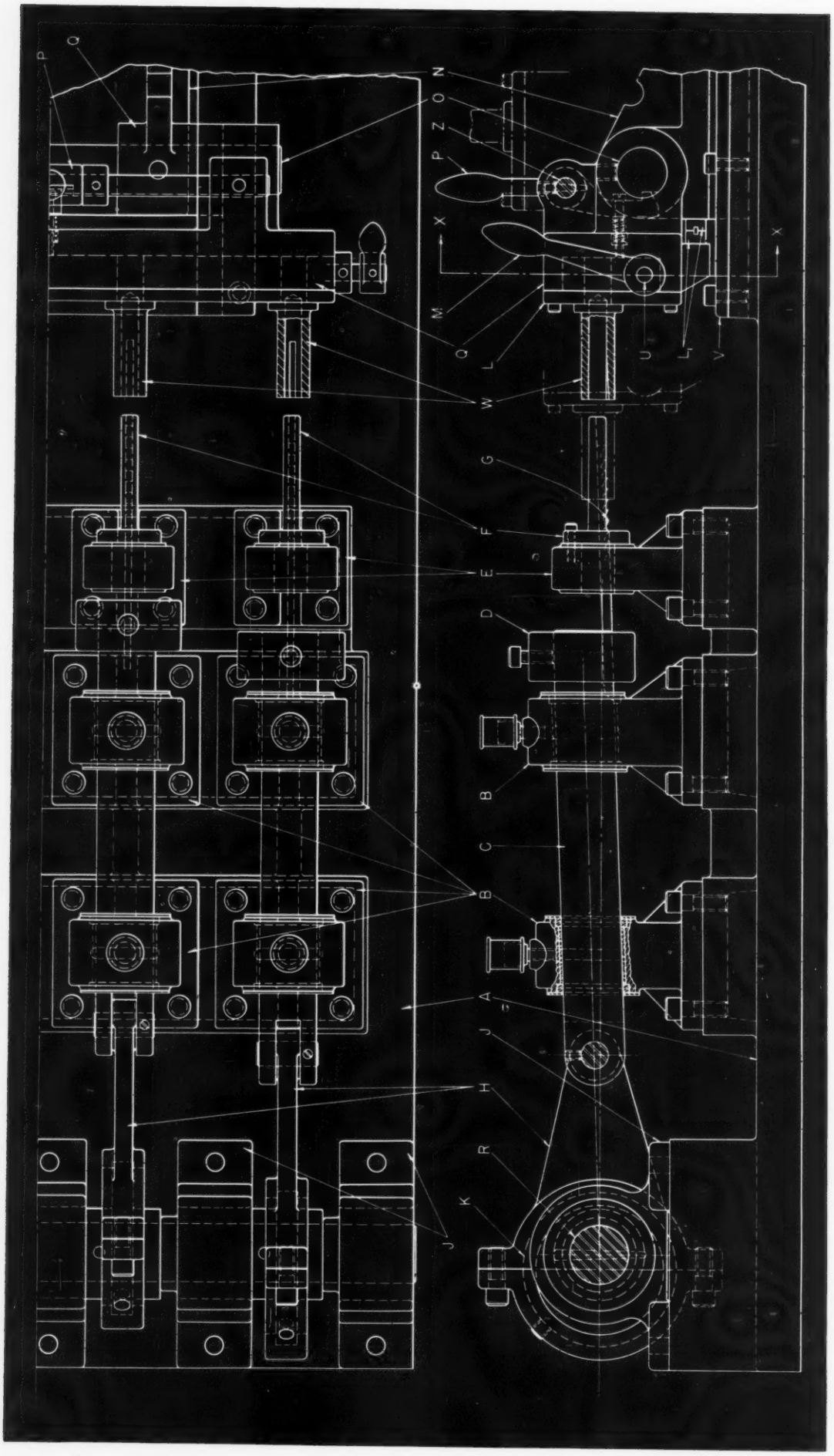


Fig. 1. Fixture for multiple broaching of internal tapered oil-grooves in work-pieces (W). Only half of the fixture is shown in the plan view, since it is symmetrical about the center line

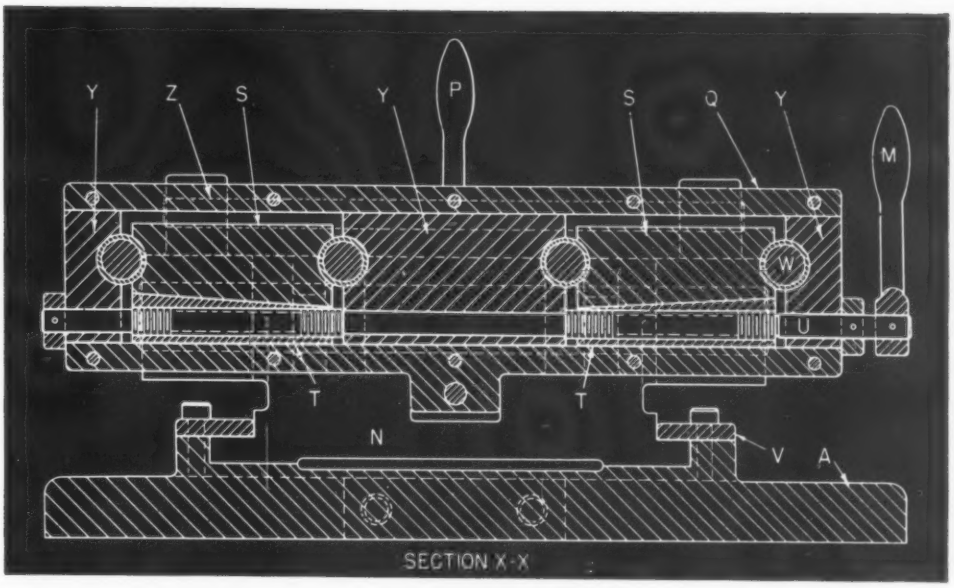


Fig. 2. Section (X-X) of the multiple broaching fixture illustrated in Fig. 1, showing the method by which the work-pieces are clamped in split bushings

Fixture for Multiple Broaching of Tapered Grooves

By HAROLD E. MURPHEY, Westerly, R. I.

The fixture here illustrated was designed for the multiple broaching of internal tapered oil-grooves in textile machine spindle steps. As shown in Figs. 1 and 2, the fixture will accommodate four parts *W*. It can be modified, however, to handle more or less work, depending upon the production required.

Bolted to the cast-iron table *A* are bearing pillow blocks *J*, shaft bearings *B*, and broach guide brackets *E*. Slide *N*, on which is mounted work-holding bracket *Q*, is fed slowly toward the reciprocating broaches *G* for cutting the grooves and rapidly retracted for loading and unloading by a double-acting pneumatic cylinder. The cylinder (not shown) is mounted on a bracket at the right-hand end of the table. The slide reciprocates in a recess cast in the table top, and is held down by straps *V*, bolted to the table.

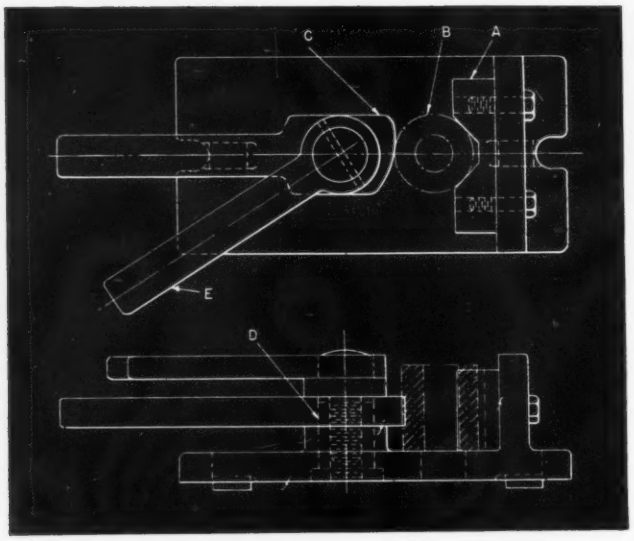
An eccentric camshaft *R* is rotated in pillow blocks *J* by a V-belt drive, not shown. Cams *K* are pinned to this eccentric shaft and set at 90 degrees from each other so that their respective lobes are equally spaced around the periphery of the shaft. This insures that no two broaches enter the work at the same time.

The cams are enclosed by connecting cranks *H*, the small-diameter ends of which pivot about pins held in shafts *C*. Thus as camshaft *R* rotates, these shafts are given a reciprocating motion, with a stroke of 7/8 inch, at the rate of 900 strokes per minute. Babbitted bearings *B* are bored to suit the angle of the oil-groove in the parts being broached. These bearings are lubricated by oil-grooves and sight-feed oilers.

The forward ends of shafts *C* are slotted to hold broaches *G*. Collars *D*, which are held on the ends of the shafts by means of set-screws, prevent the broaches from falling out of the shafts. Guide bushings *F*, which are bolted to and fit in the bores of brackets *E*, are slotted to permit reciprocation of the broaches. When the slide *N* is advanced to the broaching position, bushings *F* enter the bores of the work-pieces, as indicated by the broken lines.

Work-holding bracket *Q* can be swung about shaft *O*, which is held in slide *N*. The bracket is shown in its broaching position. To facilitate loading and unloading, the bracket is swung upward to the vertical position outlined by the broken lines. In this position, rod *Z* enters a recess on the back of slide *N*, thus preventing further movement of the bracket in this direction. When the bracket is lowered into the broaching position, it is stopped by hardened-head set-screws L_1. It is automatically secured in this position during the broaching cycle by a projection on the lower end of lever *P*, which enters a notch in shaft *O* due to spring pressure.

Bracket *Q* is machined to receive the work-locking units, as seen in Fig. 2, which consist of three stationary blocks *Y*, bolted to the bracket, and two movable members *S*. A plate is bolted to the front of bracket *Q* to hold the locking units in place. Members *S* are moved up and down by wedge-shaped blocks *T*. One block is provided with a left-hand internal thread and the other with a right-hand thread. The blocks are moved simultaneously toward or away from the center of the work-holding bracket by a correspondingly threaded shaft *U*, which is operated by hand-lever *M*. In this manner, the split bushings in which the work-pieces are held are contracted or expanded for loading or unloading.



Quick-acting cam-operated jig designed to hold circular parts for drilling or reaming

Quick-Acting Drill Jig

By ROBERT MAWSON, Providence, R. I.

A drill jig of good design must be rugged, produce accurate results, be easy to operate, and be simple to make; but most important, in order to avoid high manufacturing or production costs, it must be positive and quick-acting. The drill jig shown in the accompanying illustration possesses all of these features.

This jig is made with a base provided with two keys to fit the drill press table and two slots for bolting it to the machine. At one end of the jig is fastened a casehardened steel V-block *A* of the proper size to locate the piece *B* to be drilled. A hardened steel cam *C* which is provided with an arm is located so that sufficient pressure can be exerted on the piece to be machined when there is a slight variation in the diameter. This cam member *C* rotates on a stud *D* which has a threaded hole in it. A screw made to fit the threaded hole in stud *D* is attached to lever *E* by means of a pin.

In operation, after the drill jig has been fastened in the correct position on the machine table, the operator moves the lever *E* counter-clockwise. This action relieves the pressure on the cam-lever so that it can be rotated until the cam surface is far enough out of the way to permit a piece to be inserted in the V-block. Then, by moving the cam-lever in a clockwise direction, the piece is pushed back and held in position.

When lever *E* is rotated clockwise, the screw descends into the threaded stud and locks the cam member securely in position for the drilling or reaming operation. By reversing the motion of lever *E*, the pressure is removed from the cam lever, permitting the machined piece to be removed and another piece to be placed in the jig.

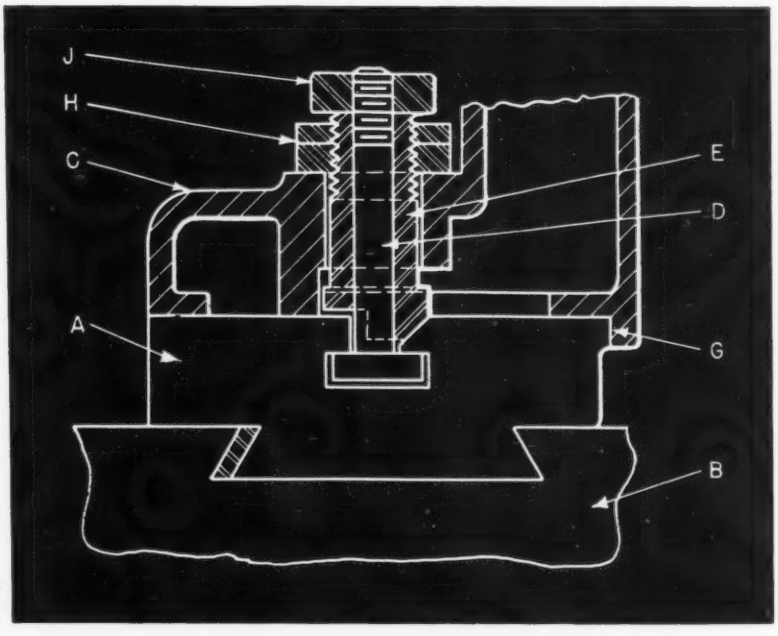
Double-Action Clamping Device

By F. SERVER

One method of clamping a headstock, tailstock, or other sliding member to the table of a machine is shown in the accompanying illustration. This device serves a double function in that the sliding member is clamped down on the table, as well as being forced against one side of it.

Table *A* can be moved transversely on base *B* of the machine. Bracket *C*, representing either the headstock or tailstock, can be moved to any desired position on the table and clamped by means of T-bolt *D* and bushing *E*. The lower end of the bushing is beveled, so that it can slide over the chamfer provided on one edge of the T-slot in the table top.

Vertical location of the bushing is pre-set by means of nuts *H* so that the lip on bracket *C* will bear against one side of the table, as shown at *G*. Then, by tightening nut *J*, the lip on the bracket will be wedged firmly against the table.



Double-action clamping method of holding bracket (C) to table (A)

THE SALES ENGINEER AND HIS PROBLEMS

By BERNARD LESTER Sales Engineering Consultant

When a New Machine Project is Shelved

"The management has decided not to spend the money now." This answer to a sales engineer's proposal occurs more frequently now than in recent years.

Many a sales engineer accepts this decision and resolves merely to keep in touch with the prospect and wait for management to change its mind. But some sales engineers set about digging deeper into the reasons for such a decision with a view to finding a way to do something about it.

Why does top management decide to shelve investing in a new machine now? Usually, increased caution concerning economic trends leads to a reduction in general investments for plant extensions or improvements. In such instances, all sales engineers are competing, not only with certain other manufacturers' representatives on a specific proposed purchase, but also with potential suppliers of all other factory equipment.

Although management's appropriations are selective and largely based upon the extent of returns on the investment, decisions concerning new equipment are influenced by the human element. Decisions to appropriate funds for this or that improvement are undoubtedly affected by interest, understanding, and human appeal. Every day we see the housewife who changes her choice of a work-saving appliance through the efforts of some aggressive salesman. Similarly, the capable sales engineer can often alter the opinions of management in the choice of a particular piece of machine equipment.

What, then, can the sales engineer do to change an adverse decision instead of meekly accepting the negative answer? He should find an answer to such questions as these:

Why was the project set aside? Was it because some other project offered a greater estimated return?

Who was most influential in making the negative decision? What one or two men may be influencing the rest of the management?

Did the plant equipment men within the company have a strong enough say? Were they "sold," themselves, on the advantages of the purchase? Did they have sufficient initiative and appeal to reach and influence top-side officials?

Answers to these questions will point the way for the sales engineer's diplomatic procedure, and lead to a renewed and possibly a different plan of attack.

The sales engineer should first review his project to see that every possible advantage has been explained and dramatized—that every economy and every value have been established and made real in the minds of the interested persons.

Second, the sales engineer should determine how and to whom in the management his project has been presented by the plant equipment men.

The sales engineer can then proceed strategically in three ways: He can direct further effort toward plant and equipment officials; reach the management group not sold on his project; and evaluate those financial interests that may be involved outside of the purchasing company and convince them of the merits of his equipment. Sometimes the success of the project depends on bank loans, and the bankers involved may not have an accurate mental picture or a full understanding of the advantages of the equipment under consideration.

Usually the most fruitful procedure is for the sales engineer to work closely with the plant and equipment officials until he gains a chance to share in the job of selling management. In this way the capable salesman can build up the importance of these men and give them every credit for initiative and accomplishment. A team approach—made by a group of enthusiastic and aggressive men working together—can get further than the individual sales engineer, who, single-handed, tries to cut around the corner.

"Waiting for lower prices" is often given as a reason for delay in buying equipment. In such

cases, the salesman must carefully calculate the loss that would occur by the delay, compared with the cost of going ahead immediately, and make this loss clear to the prospect.

"Lack of appropriation" is a difficult objection to answer. But appropriations are generally obtained for those projects that appear to insure the greatest reward. During the meager depression days of 1932, one sales engineer among my acquaintances made an important sale by skillfully justifying an equipment investment, and then going directly to the local bank and negotiating a loan to cover the investment.

* * *

Government Study of Employment Outlook

The Bureau of Labor Statistics has made a survey of 288 skilled and technical occupations and has presented the results in a book entitled "Occupational Outlook Handbook." This study on the present supply and future demand for skilled workers includes information on mechanical, metallurgical, and industrial engineers, industrial designers, and draftsmen. The book can be obtained from the Government Printing Office in Washington, D. C., at $1.75 a copy.

* * *

We have been able to produce more for more people because the hope of profits is what gets the job done with the minimum expenditure of man-hours and materials. No more effective incentive than the profit incentive has ever been found.—*C. E. Wilson, President, General Motors*

Isotopes in the Machine Shop

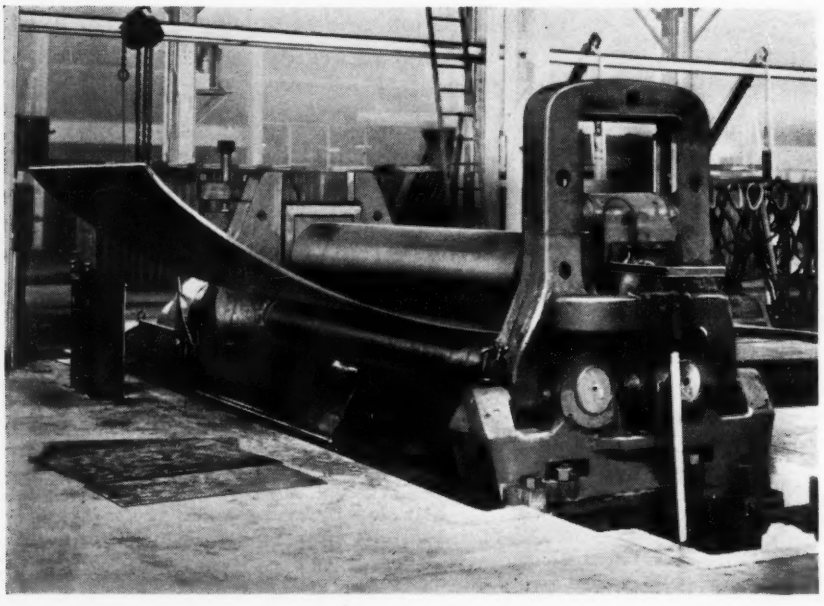
The atomic pile is already furnishing industry with a useful tool in radioactive isotopes. One application of particular convenience has been developed in the foundry. It is usually difficult for the foundryman to determine how high the molten metal has risen in a cupola because of the intense heat. Now engineers can send gamma rays through the cupola, measure with a Geiger counter on the opposite side the intensity of the rays, and thus determine whether the rays pass through the molten metal or the gas above it. The point at which the radiation count changes shows the actual liquid level in the cupola.

Another application is in the examination of thick sections of metal with isotopes of Cobalt 60, a radioactive metal with penetrating power comparable to a 2,000,000-volt X-ray machine.

In automotive plants, piston-rings and other motor parts have been made radioactive for use in studies of friction. In one case, radioactive piston-rings were installed in a test engine which was allowed to run a few hours, after which a sample of oil was taken from the crankcase. The radioactive particles that had been worn off the rings were then measured by a Geiger counter. In this way, the amount of wear in the engine was determined within a millionth of an ounce of metal. The comparative wear on piston-rings that occurs when using different lubricating oils can thus be established.

* * *

Shot-peening of partially hardened structures cannot be relied on to replace complete hardening to bolster the resistance of steel.



Steel plate 1 inch in thickness is accurately rolled into cones by application of the Baldwin-Southwark plate bending roll here shown in the plant of the National Annealing Box Co., Washington, Pa. A typical cone produced by this 14-foot pyramid type bending roll is 8 feet in diameter at the base, 3 feet in diameter at the top, and has an inclined height of 10 feet. The same equipment is employed for rolling cylinders from steel plate

Shop Equipment News

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

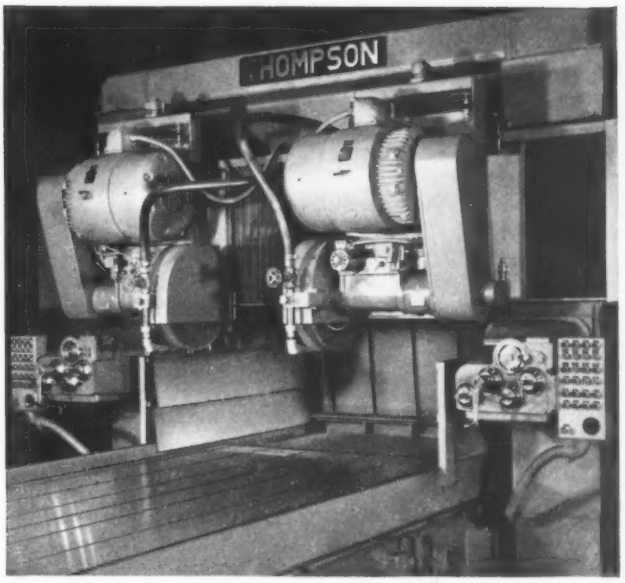


Fig. 2. Close-up view of the two vertical heads and controls of the "Hydrail" machine shown in Fig. 1

Thompson "Hydrail" Surface Grinders

The Thompson Grinder Co., Springfield, Ohio, has just announced the development of a complete new line of "Hydrail" machines especially designed to handle a wide range of large work, from rough to finish grinding. These machines are available in capacities up to 48 inches for both vertical and horizontal grinding, with tables up to 240 inches in length. The grinding wheel head or heads are mounted on a massive bridge to insure rigidity.

The machine illustrated has two heads, which are arranged to operate independently or together according to the specifications of the user. This particular machine is furnished for grinding wear strips in the horn guides of bearing and wheel casings of anti-friction railroad housings. There is sufficient clearance on this machine to permit grinding the housings with the train wheels in position. The wheels, together with

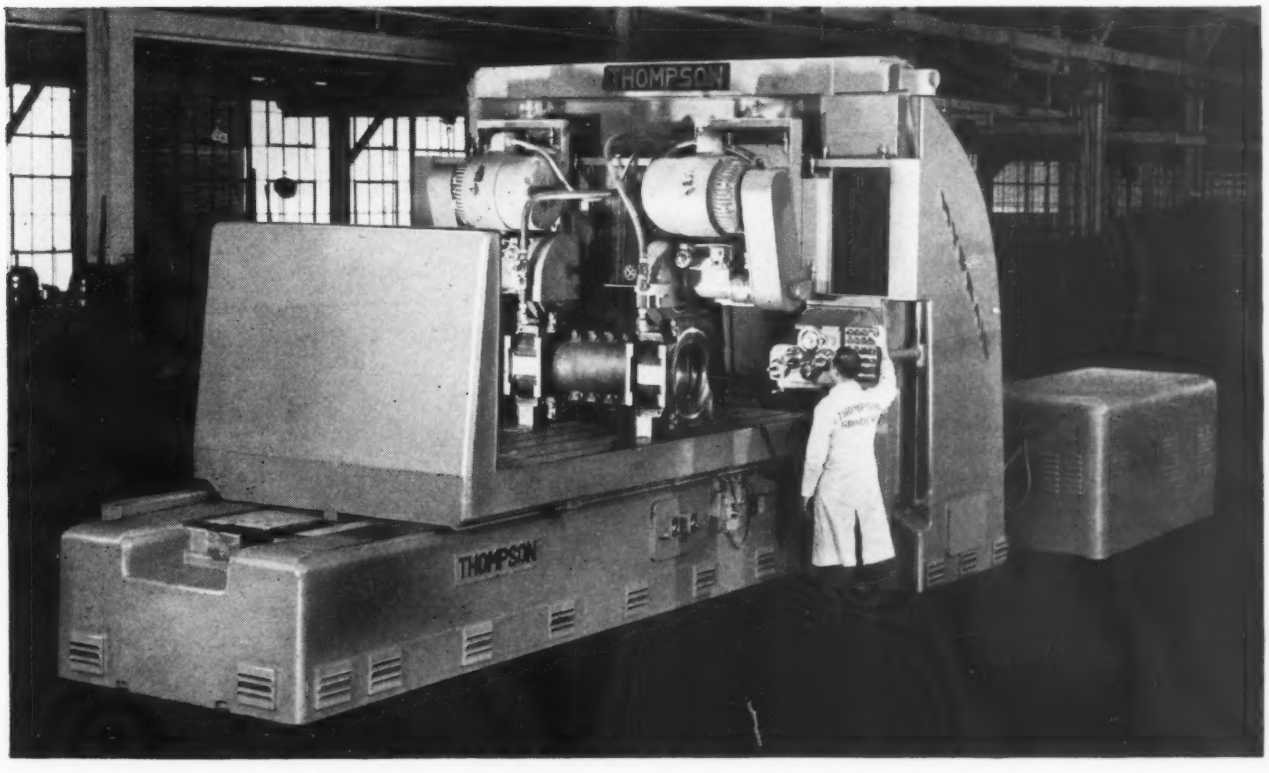


Fig. 1. Thompson "Hydrail" surface grinder with anti-friction railroad housing in position for grinding hardened wear strips in the horn guides

To obtain additional information on equipment described on this page, see lower part of page 212.

the housing, can be lifted into place for the grinding operation to save time in railroad maintenance shops. It is possible for two operators to control the machine while grinding two horn guides simultaneously.

The close-up view, Fig. 2, shows the two vertical heads of the machine illustrated in Fig. 1, with their respective controls and dials. Although this machine is available with two horizontal heads or one horizontal and one vertical head, only one head is ordinarily required. Full push-button control, as well as manual control, on both sides of the table are shown in this illustration.

The table speeds of the new machine are adjustable from 10 to 100 feet per minute. The entire hydraulic power unit is enclosed in the tank shown at the right-hand side of the column in Fig. 1, and the coolant pump is on the opposite side of the machine. The machine is equipped with thirteen motors, developing a total of 100 H.P. The two wheel-head motors are each 30 H.P. and operate at 120 R.P.M. The weight of the machine, complete, is somewhat over 65 tons. 61

Pines Automatic Tube- and Rod-End Finishing Machine

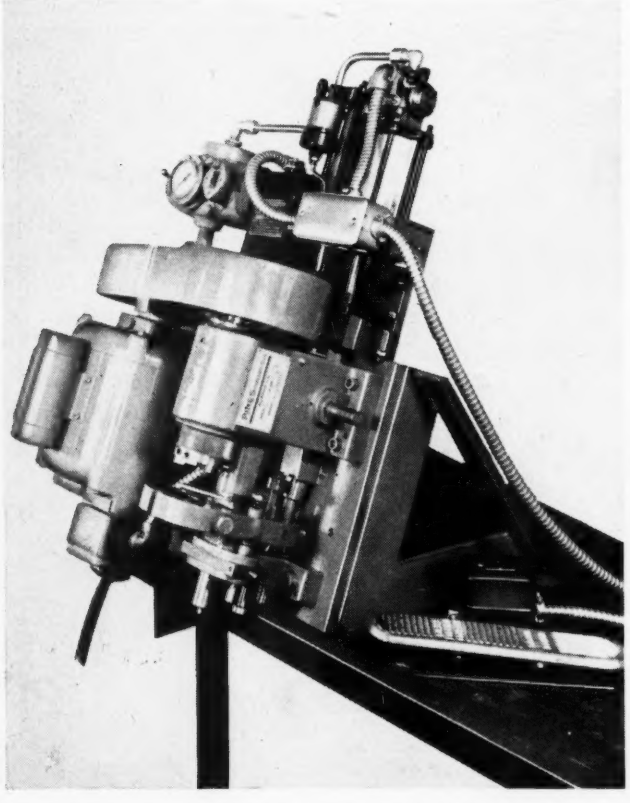
The Pines Engineering Co., Inc., 652 Walnut, Aurora, Ill., has brought out a small bench model, high-speed tube-deburring and end-finishing machine designed for automatic air operation. This machine has a foot-switch operated air cylinder, which leaves the operator's hands free to handle the work. Parts up to 2 inches in diameter can be machined at speeds of 800 to 1200 an hour. A vertical mounting base is available as accessory equipment which permits gravity unloading of short workpieces, so that all the operator is required to do is load the chuck.

The chuck and work feed are actuated by a direct pull of the air cylinder, which provides rapid forward and reverse travel of the work to the tool with an adjustable hydro-check to control the feed, speed, and depth of cut. A work-positioning stop and an adjustable positive "depth of cut" stop combine to insure accurate work. Only sixty seconds is required to change the replaceable chuck jaw inserts and threaded tool-holder to accommodate work of a different diameter.

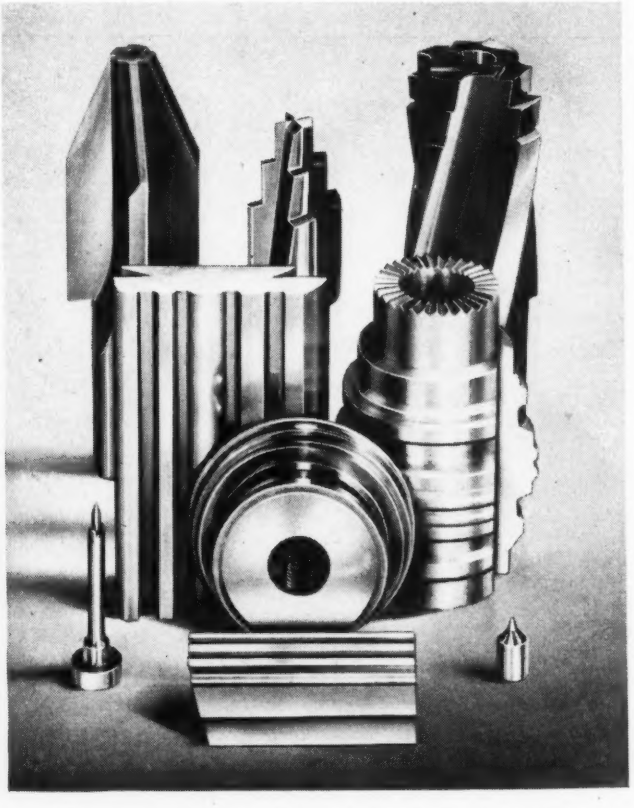
Eight spindle speeds are obtained with the step-sheave V-belt drive, which provides for maximum operating efficiency on work of any size up to the full 2-inch capacity of the machine. Tooling equipment can be furnished for other end-finishing operations, such as center drilling, rod chamfering, reaming, pointing, and boring, in addition to deburring operations. 62

"Micro-Keen" Form Tools

A wide range of special form tools is being manufactured under the trade name "Micro-Keen" by the Johns-Hartford Tool Co., Box 314, Hartford, Conn. These tools are made of "Carbalt" super high-speed steel, and are designed to increase the output and reduce the cost of automatic screw machine products. Precision equipment is employed to insure the accurate grinding of special profiles and forms on the circular and flat tools, counterbores, reamers, recessing tools, punches, rolls, and heading dies of the new line. 63



Tube- and rod-end finishing machine designed for automatic air operation



Typical examples of "Micro-Keen" form tools made by Johns-Hartford Tool Co.

To obtain additional information on equipment described on this page, see lower part of page 212.

South Bend Precision Bench Shaper

The South Bend Lathe Works, 383 E. Madison St., South Bend 22, Ind., has just added a bench shaper to its line of precision machine tools. This new shaper is built to perform highly accurate machining operations on small parts that are within its capacity range. It is designed and constructed for industrial as well as tool-room use. The ram and table slides are milled and hand-scraped for precision fits and are provided with adjustable gibs. Accurately cut steel or fiber gears are used to insure smooth, quiet operation.

The shaper ram is 18 inches long and has a stroke adjustment range of 0 to 7 inches. The cutting speed is variable from 3 to 114 feet per minute. Stroke rates of 42, 75, 120, and 195 per minute are obtained by shifting a V-belt on four-step cone pulleys, the belt changing being facilitated by a belt tension release.

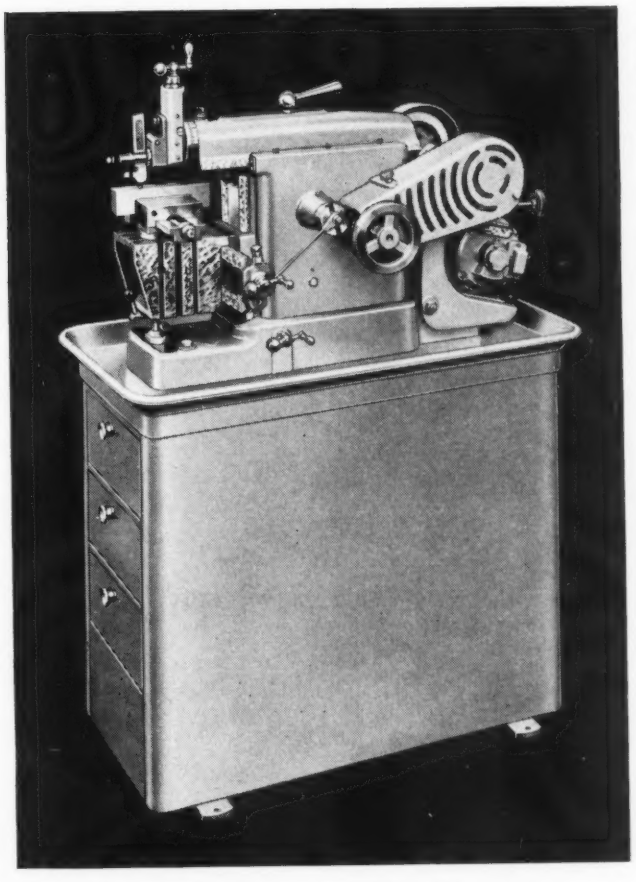
The tool-head of the shaper has a 3-inch feed, can be swiveled to any angle, and has a positive lock. The swivel clapper-box allows tool clearance adjustments, the graduated collar on the feed-screw reads in thousandths of an inch, and the toolpost takes tools with shanks 3/8 inch by 7/8 inch. The table has a working surface of 5 7/16 by 5 inches and is 6 inches deep. It is slotted on the top and sides, has holes for attaching the vise and special work-clamps in various positions, and is equipped with an adjustable outboard support for the base.

Reversible power cross-feeds for the table range from 0.002 to 0.016 inch per ram stroke and are indicated by a graduated plate. Horizontal table travel is 9 1/2 inches, vertical travel is 5 inches, and the maximum distance from table to ram is 5 1/2 inches. The vise has a graduated base and can be swiveled to any angle. The vise jaws are 4 inches wide, 1 inch deep, and open to 4 inches. A 1/3-H.P., 1725-R.P.M. motor mounted on a cradle attached to the back of the machine is required to operate the shaper. 64

Precision Hobbing Machine for Small Spur, Helical, and Bevel Gears

A gear-generating machine designed to hob small spur, helical, and bevel gears with a high degree of accuracy and at fast production rates has been announced by the Hamilton Tool Co., Hanover at Ninth, Hamilton, Ohio. This No. 1 gear-hobber handles work from 0.050 inch to 6 inches outside diameter; provides twelve hobbing speeds from 109 to 1259 R.P.M.; has a hob-spindle turntable that swivels 105 degrees to the left and 135 degrees to the right; can be set for helix leads of from 0.800 inch to 130 inches; and operates on a 1-H.P. motor.

The speeds, feeds, and indexing movements can be selected individually, making possible the quick selection of a speed and feed to suit any material and any size gear. This also reduces set-up time and makes the machine well adapted for use on job work, as well as production runs. 65



Precision bench shaper placed on the market by the South Bend Lathe Works

Hamilton precision hobbing machine for producing small helical and bevel gears

To obtain additional information on equipment described on this page, see lower part of page 212.

Danly High-Production Precision Presses

Danly Machine Specialties, Inc., 2200 S. 52nd Ave., Chicago 50, Ill., has brought out a complete line of medium- to high-tonnage capacity mechanical presses designed for faster, more efficient operation. These new presses are of sturdy fabricated-steel construction and are adapted for stamping operations employing standard, progressive, or multiple dies.

The mechanical presses of various sizes and types in this line include high-production units having speeds up to 250 strokes per minute with capacities ranging from 50 to 800 tons. Automatic feeding of coil and strip stock is used effectively. The presses can be obtained with the following drives: Direct non-geared crank drive, single-reduction gear eccentric drive, and double-reduction gear eccentric drive. The improved features of these presses have been developed to meet important stamping requirements of the automotive, electrical, agricultural appliance, and other industries.

An outstanding feature is a new type of floating friction block clutch which transfers 85 per cent of the flywheel momentum to the drive-shaft upon engagement. Most of the clutch parts rotate with the flywheel, and thus add to its momentum. This construction is said to greatly reduce wear on the clutch, which is fan-cooled, air-operated, and externally mounted to simplify maintenance. The clutch is actuated by an electric solenoid controlled through a push-button station, which can be located to suit the convenience of the operator. Maximum safety is provided by interlocking circuits and non-repeat, inching, and variable-speed controls. 66

Hardinge Second-Operation Machine with Air-Operated Collet

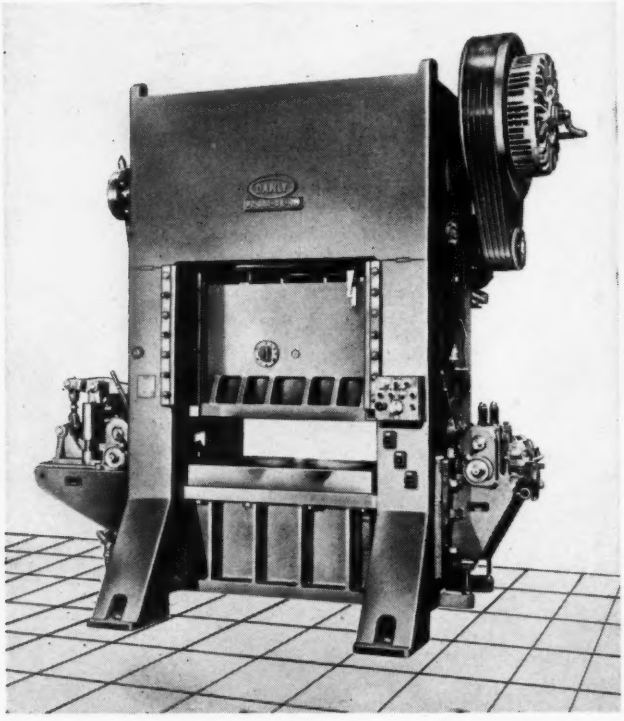
Hardinge Brothers, Inc., Elmira, N. Y., has just announced a new Model AC 59 high-speed second-operation machine equipped with an air-operated collet. This precision machine incorporates all the features of the present line of Hardinge second-operation machines. The new air-operated collet is designed to meet the need for faster operating machines where the machining time is short and the chucking time must be correspondingly fast.

With this machine, the operator closes and opens the collet by simply actuating a foot-pedal which operates an air valve. Foot control of the collet leaves the operator's hands free to load and unload the work and to feed the cutting tool slides. The collet is designed to hold work accurately without distortion, even though there is considerable variation in the chucking diameters of the work. It operates on standard shop air line pressure. The collet chuck can be instantly closed or opened when the spindle is at rest or operating at any speed.

The pre-loaded ball-bearing center-drive headstock spindle has a collet capacity for handling 1-inch round, 7/8-inch hexagonal, and 3/4-inch square work. The maximum step chuck capacity is 6 inches. Eight spindle speeds are available in either forward or reverse direction from 250 to 4000 R.P.M., three other speed ranges being available for varied production requirements. 67

"Akrite" Air-Operated Presses

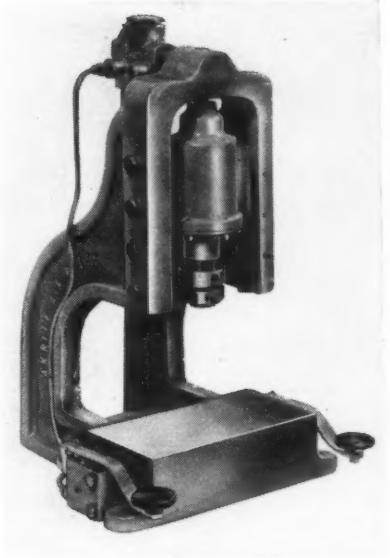
The Clayton Mfg. Co., 207 Delaware Ave., Buffalo 2, N. Y., has announced three new "Akrite" air-operated presses capable of



High-production 200-ton press with stock feed and scrap cutter, brought out by Danly Machine Specialties, Inc.

Second-operation lathe equipped with foot-controlled, air-operated collet, built by Hardinge Brothers

To obtain additional information on equipment described on this page, see lower part of page 212.



Air-operated press brought out by the Clayton Mfg. Co.

delivering maximum pressure blows on their anvils of 400, 1200, and 2000 pounds when operated on an air-line pressure of 100 pounds per square inch. These presses are so designed that very simple dies and tools can be used and most of the finished parts can be pushed through the opening at the back of the press without further handling.

They are especially well adapted for assembling, stacking, swaging, and forming operations, and can also be used for light stamping. An air-line regulator can be used to insure applying just the right amount of air pressure for doing an accurate job with economical air consumption. A control valve on top of the cylinder can be adjusted to provide a cushioning effect on the work. Safe operation is insured by two hand-actuated air valves, which are so connected that the press will not operate unless both operating levers are depressed. Uniformity of stroke is provided by a special valve with speed control adjustment.

The smallest size (Model 400) press is 10 1/2 by 10 by 17 1/4 inches, and has a die-bed 7 3/4 by 4 inches, a throat depth of 5 inches from center to back, a stroke of 1 3/4 inches, and tool adjustment of 1 1/4 inches. The largest size (Model 2000) press is 15 1/2 by 12 by 24 inches, and has a die-bed 6 1/2 by 13 inches, a throat depth of 6 inches (measured from front to back), tool adjustment of 2 1/2 inches, and a stroke of 3 inches. 68

Snyder Automatic Cylinder-Block Counterboring and Reaming Machine

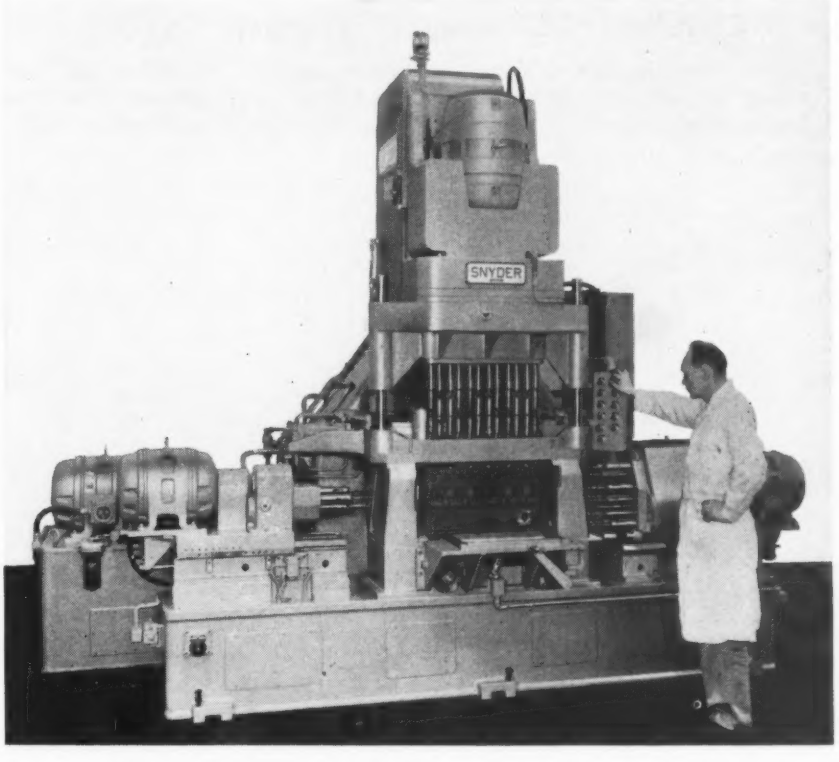
A new three-way automatic machine designed for processing thirty-two holes in six-cylinder cast-iron alloy cylinder blocks has been announced by the Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. This special machine counterbores six exhaust-valve insert holes; taper-reams six inlet-valve passages from the top; counterbores one hole for the Welch plug; countersinks two holes in the rear end of the block; and countersinks seventeen holes in the front end of a block every forty-five seconds.

The cylinder block is loaded on an elevator platform and lowered over the locating pins. It is then clamped at both ends by two hydraulically operated wedge type clamps. The automatic work cycle is interlocked with the hydraulic clamping mechanism, and can be started only when clamping is completed. High-speed steel tools are used at speeds ranging from 60 to 90 surface feet per minute. The tool feeds can be varied to suit different materials.

The two horizontal heads and the vertical head have strokes of 10 and 12 inches. The left- and right- hand horizontal heads have 5-H.P. and 7 1/2-H.P. motors, respectively, and are mounted on slide units. The vertical head is driven by a 15-H.P. motor, and is mounted on a slide unit on a special wishbone type column with standard counterbalance weight set-up. The machine occupies a floor space of 80 by 150 inches. The production is seventy-seven blocks an hour. 69

Improved Lapping Compound

A new three-way improved lapping compound known as "Timecutter," which is said to cut hardened steel at very rapid rates, has been introduced by the Timesaver Products Co., 546 W. Washington Blvd., Chicago 6, Ill. The oil base of this compound is designed to hold the abrasive grains at the point of contact in such a manner that they will grind effectively instead of rolling with or escaping from the surface being lapped. The compound is said to wash off in a sludge, which thoroughly carries off the silicon carbide. The "Timecutter" compound is available in ten different grits. 70



Three-way automatic cylinder-block counterboring and reaming machine built by the Snyder Tool & Engineering Co.

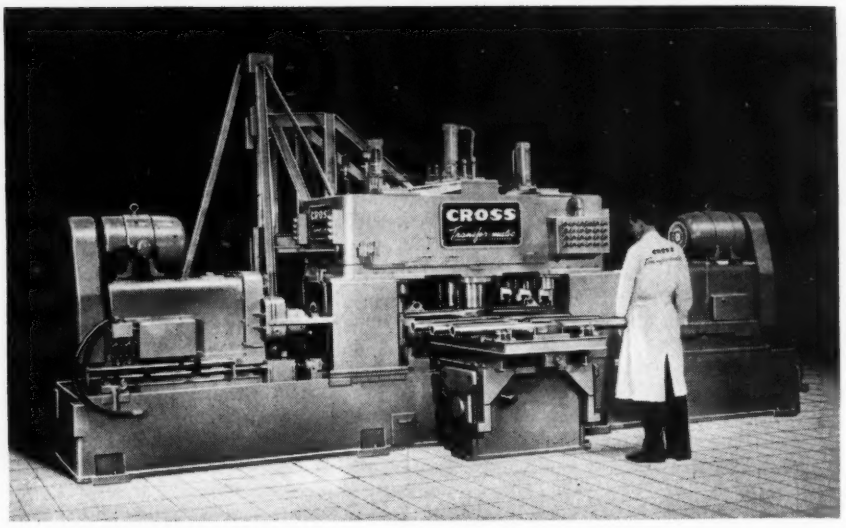
To obtain additional information on equipment described on this page, see lower part of page 212.

Cross Special Machine for Boring and Facing Axle Housings

A machine designed to bore and face three types of automotive axle housings without changing the set-up has been developed by The Cross Company, Detroit 7, Mich. With the machine running at 100 per cent efficiency, it is possible for one unskilled operator to completely process 280 axle housings an hour.

The machine is a three-station transfer type unit, or "Transfermatic," equipped with material-handling devices that automatically move the parts from one operating position to the next as the machining operations are completed. Three types of axles in two different lengths are handled on this machine.

The axles are loaded at the first station; at the second station, both ends are bored and faced, the machine automatically making the proper adjustment for length through an electric eye arrangement; while at the third station, the parts are automatically sorted by type and placed on one of two conveyors, depending upon subsequent processing requirements. One conveyor, which travels at right angles to the machine, receives all axles with insulator brackets attached, while the second conveyor receives all other axles, continuing the flow of work through the machine.

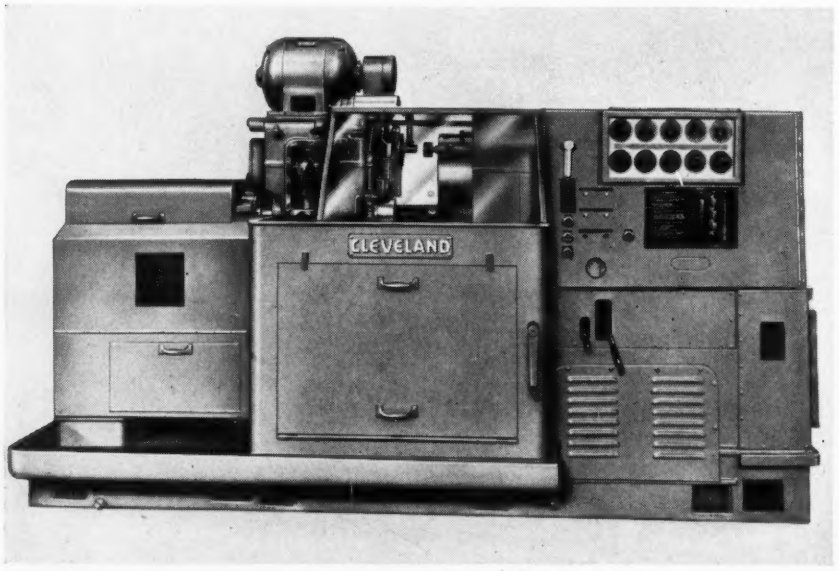


Special machine for boring and facing automotive axles brought out by The Cross Company

Being made up of standard Cross sub-assemblies, this machine can be easily rearranged to accommodate changes in part design. Features of the machine include hydraulic feeds, hardened and ground steel ways, and an automatic push-button controlled working cycle. 71

Cleveland "Dialmatic" of Improved Design

Refinements in the design of the new "Dialmatic" Model AB 1/2-inch single-spindle automatic screw machine manufactured by the Cleveland Automatic Machine Co., 4936 Beech St., Cincinnati 12, Ohio, include redesigned main guards that permit easy access to the tools and facilitate chip removal. The front panel, which serves as the main guard, can be quickly lowered to form a chute that enables the chips to be raked out of the pan directly into a container for quick disposal. The extensive use of "Plexiglas" in the front and rear guards greatly increases visibility in the tooling area. The "Plexiglas" panels are hinged, so that they can be easily raised out of the way of the operator or set-up man whenever it is necessary to inspect the work or make adjustments.



Improved model "Dialmatic" single-spindle automatic screw machine built by the Cleveland Automatic Machine Co.

An outstanding feature of this machine is the electric feed drive, which makes possible independent and infinitely variable forward and return tool feeds for each of the five tool positions in the turret without making cam changes. Forward and return feed settings are made by positioning ten dial rheostats on the control panel. Quick disconnect plugs are now used to link all electric connections leading to and from the motor-generator set, thus simplifying the removal of these units for inspection and maintenance.

The electric control panel has been redesigned to make controls more accessible and to provide signal lights to aid the operator in running the machine. Two of these lights show the direction of spindle rotation, two others show whether the spindle is in fast or slow drive, and the remaining two indicate whether the machine feed or rapid-traverse movement is in operation. 72

To obtain additional information on equipment described on this page, see lower part of page 212.

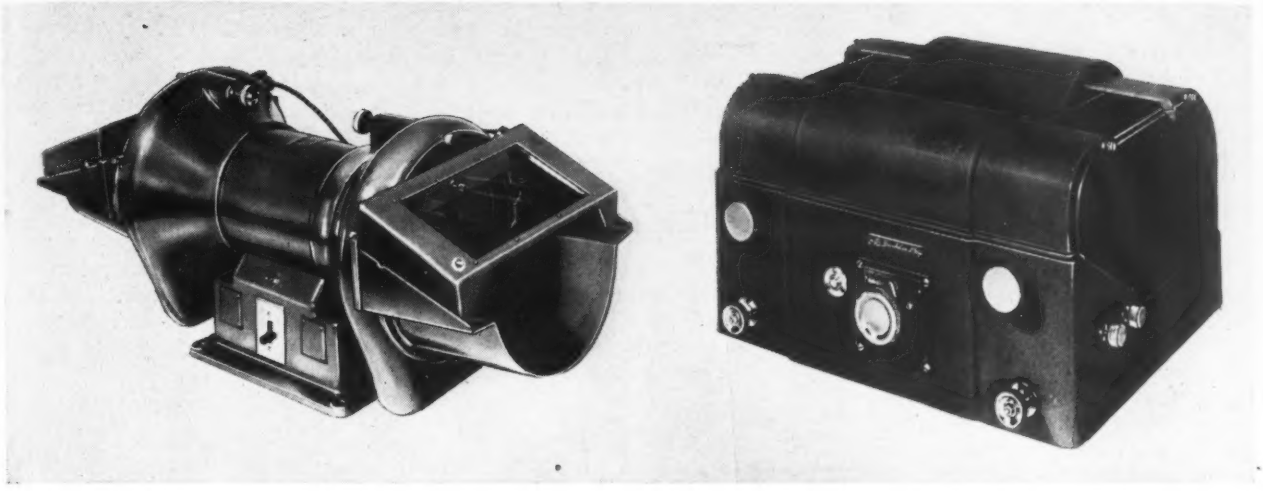


Fig. 1. (Left) Buehler wet power grinding machine. Fig. 2. (Right) Buehler "Duo-Belt" wet surfacing machine

Buehler Grinding and Surfacing Machines

Buehler Ltd., 165 W. Wacker Drive, Chicago 1, Ill., has brought out two new machines — a wet grinder and a "Duo-Belt" wet surfacer. The wet power grinder, Fig. 1, is a general-purpose machine which can be used in the shop or tool-room for the dressing, touching up, or rough flat form-grinding of standard tools or small parts by hand. It is provided with two wheels which can be had in a variety of grits, and is available for either bench or floor mounting.

The wheels of this grinder are bathed continuously in a clean spray of water or water soluble oil from a recirculating unit equipped with a series of settling tanks. Continuous inspection of the work is possible through wide-vision safety windows and flood-lighted wheel surfaces.

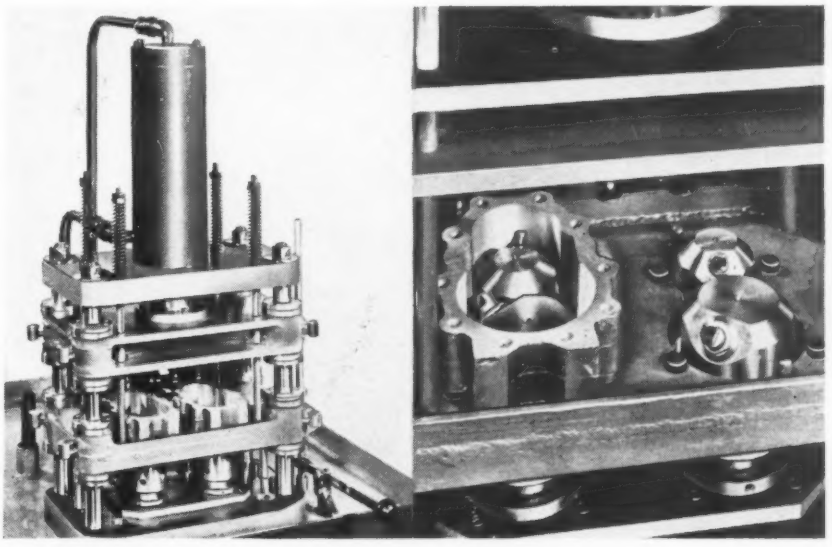
A diamond dressing attachment with micrometer adjustment is available, which makes possible close control of wheel flatness. The wheels are backed with steel to minimize vibration. The wet wheel and its surrounding moisture-laden atmosphere prevent the formation of dust hazards, such as are caused by poisonous beryllium and other dust. Magnesium can be ground without danger of fire or explosion.

The "Duo-Belt" wet surfacer shown in Fig. 2 provides a shop or toolroom with a quick, safe means of hand-grinding standard tools or small production parts. This machine is equipped to drive two belts simultaneously at either 1600 or 3200 feet per minute. The belts are made of cloth-backed silicon carbide, with grits ranging from 80 to 600. Coolant is furnished each belt independently and uniformly by a valve-controlled spray head. The coolant spray can be connected directly to the regular water lines or to a recirculating cooling system, which can be supplied by the manufacturer with the machine.

Among the advantages claimed for this machine are production of uniformly flat surfaces, since flow of metal from local hot spots is eliminated; and true cutting action, without burnishing. 73

Zagar Special Machine for Precision Boring of Pump Housings

A special four-spindle machine has been developed by Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 23, Ohio, for boring pump housings to a total depth of 1 1/2 inches within a tolerance of plus or minus 0.0005 inch. The geared head of this machine is located in an inverted position, as shown in the close-up view at the right of the illustration, to obtain more efficient clearing away of chips. A hydraulic cylinder provides fast travel of the work to the boring position, followed by a normal boring feed and fast return. The part is rough-bored in the position shown at the left and then transferred to the position at the right, where it is finish-bored while a new part is being rough-bored at the left. Thus, one part is com-



Multi-spindle geared-head machine developed by Zagar Tool, Inc., for rough- and finish-boring pump housings

To obtain additional information on equipment described on this page, see lower part of page 212.

pleted at every cycle of the machine.

The pump housings are supported by four buttons, and accurately positioned by two dowel-pins at each position. A spring-loaded ram plate holds the parts securely. The machine is completely hydraulic in operation. "Microbore" cutters are used in special holders for the rough- and finish-boring operations. 74

Hauser Profile-Measuring Microscope

A new kind of profile-measuring microscope designed for high-precision measuring and control of profiles through the use of enlarged-scale drawings is now available from the Hauser Machine Tool Corporation, Manhasset, N. Y., factory representative in this country for the manufacturer, Henri Hauser, Ltd., of Bienne, Switzerland. This new instrument provides means for comparing the enlarged projected image with a correspondingly enlarged outline drawing of the tool, thread, gage, or similar work. The comparisons can be made with drawings six, ten, twenty, thirty, or fifty times the full size of the part to be measured without requiring special graticules.

The instrument is adapted for checking core diameters, pitch, angle of inclination and the form of threads; measuring cutting and edge angles of tools and angles of gages and templets; making coordinate measurements of various work-pieces and checking profiles of tools or gages.

The outlines of the profile drawing will appear red when viewed through the eye-piece, while the image of the object itself appears green. These two different colors, being in sharp contrast, cause the contour lines of the drawing and the image to show clearly, even in cases where overlapping occurs. Two special tool-carriers are provided for work that cannot be placed directly on the table. The measuring table is 5 1/2 by 8 inches, and has a rotating glass center; the range of angular measurement is 360 degrees with vernier reading to 5 minutes; and the largest diameter of work that can be measured is 3 17/32 inches. 75

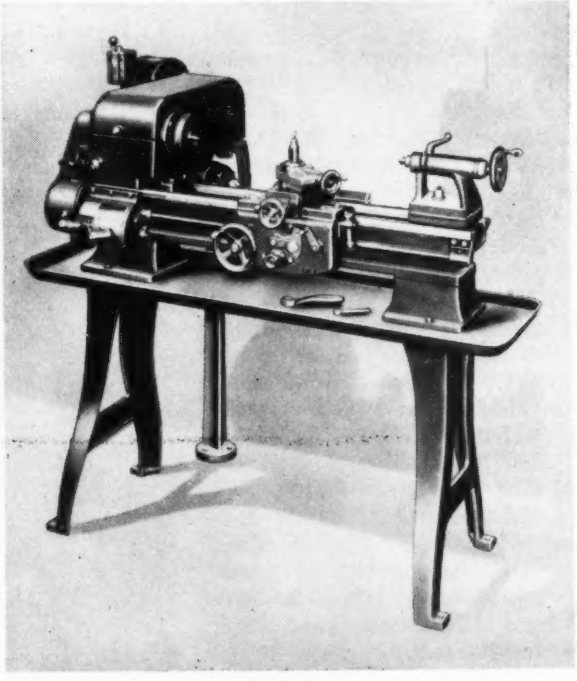
Logan Improved Lathes

Increased capacity and improved construction are features of an 11-inch swing lathe now being manufactured by the Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30, Ill. The draw-in collets of this lathe have a capacity of 1 inch. The lathe is available in center distance capacities of 24 and 36 inches. The over-all construction is considerably heavier than that of preceding models, and all the advanced design features of the earlier 9- and 10-inch lathes have been retained.

The new lathe, for example, has a heavier headstock, combined with the Logan pre-loaded ball-bearing spindle mounting designed to assure sustained accuracy at all spindle speeds from 45 to 1500 R.P.M. The total spindle run-out is held to within 0.0005 inch at a point 12 inches from the bearing. The two V-ways and two flat ways of the heavier bed are precision-ground to a tolerance of 0.0005 inch along the full lineal capacity range of the lathe. Self-lubricating bronze bearings serve to protect the lathe against wear at points where bearings are not ordinarily employed.

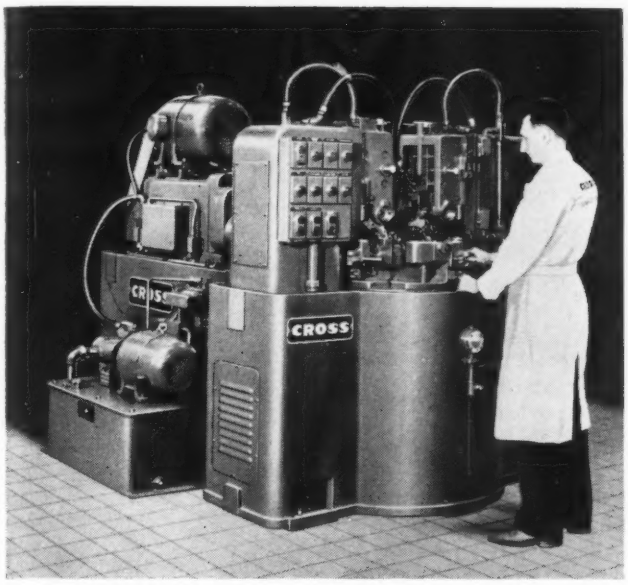
Full quick-change gear equipment provides for instant selection of any one of forty-eight threads and feeds. The machine is available in cabinet and bench models, as well as in the conventional floor type. Cabinet models have a new, more rigid design and an improved underneath drive. 76

Profile-measuring microscope introduced by the Hauser Machine Tool Corporation

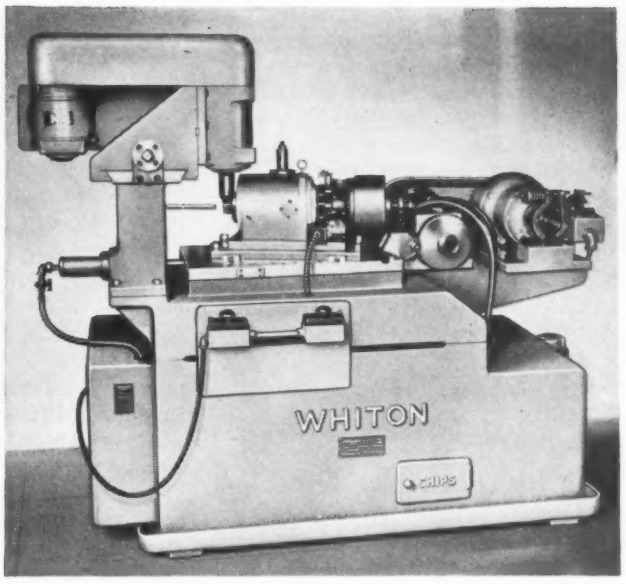


Floor type lathe of increased capacity brought out by the Logan Engineering Co.

To obtain additional information on equipment described on this page, see lower part of page 212.



Automatic machine designed by The Cross Company for boring and facing gear pockets of differential cases



Special-purpose machine for cutting spur and bevel gears brought out by the Whiton Machine Co.

Automatic for Machining Differential Cases

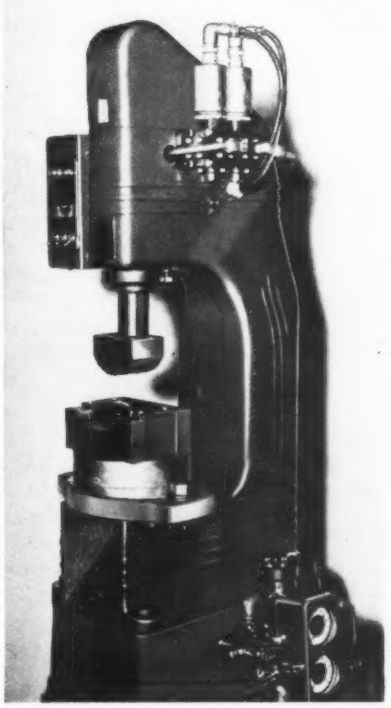
The side gear pockets of differential cases can be automatically bored and faced at the rate of 100 pieces per hour on a machine especially designed for this job by The Cross Company, Detroit 7, Mich. The operator merely loads and unloads the parts and presses the cycle starting button. One unskilled operator can easily handle two of these machines. Flexibility for product design changes is provided for through the use of standard units, which are quickly interchangeable. 77

Taber Production Press

The Taber Instrument Corporation, 111-M Goundry St., North Tonawanda, N. Y., is producing an air-operated press with hydraulically controlled ram movement. Precise electronic timing features provide an adjustable preset rate of movement for closing the die or performing an operation. This new Model 129 press is adaptable for drawing, forming, and assembling operations where a variety of conditions are encountered.

The pressure of the ram is adjustable from 100 pounds to 2 tons. The rate of ram travel can be varied from 1000 inches per minute down to 10 inches per minute or less by simple manipulation of the controlling valves. The electronic control panel provides for one or more stop periods of varying duration to meet the requirements of the work being handled.

These presses are furnished in several models and capacities which are suitable for slow or very rapid operation, and are provided with one or more adjustable ram-positioning stops, depending upon the service requirements for which they are designed. 78



Taber production press with hydraulically controlled electronically timed ram

Whiton Special-Purpose Milling Machine

The Whiton Machine Co., New London, Conn., has announced a high-production milling machine designed primarily for cutting bevel and spur gears and pinions, but which is readily adaptable for a wide range of milling operations. For example, any work requiring the milling of one or more slots on the face or outside diameter and hexagonal or square work requiring the milling of several surfaces can be handled.

This machine has a heavy vertical spindle, mounted in anti-friction bearings, which is motor-driven through V-belts. The spindle unit is adjustable both horizontally and vertically, and is adapted for the use of carbide cutters. The table is actuated by a combination air and cam arrangement which imparts a rapid advance to and from the cutting position and the proper feed for the cut. The cam arrangement can be so adjusted that stock removal will be maintained at a uniform rate. The camshaft for operating the table travel is mounted in large anti-friction bearings, and has an individual motor drive through a chain and sprocket.

The work-spindle can be swiveled for milling at any angle up to 90 degrees. Spindle indexing is accomplished by index-plates actuated and locked in position by an air cylinder. Indexing is timed to occur at the end of the stroke. The work is normally held in the work-

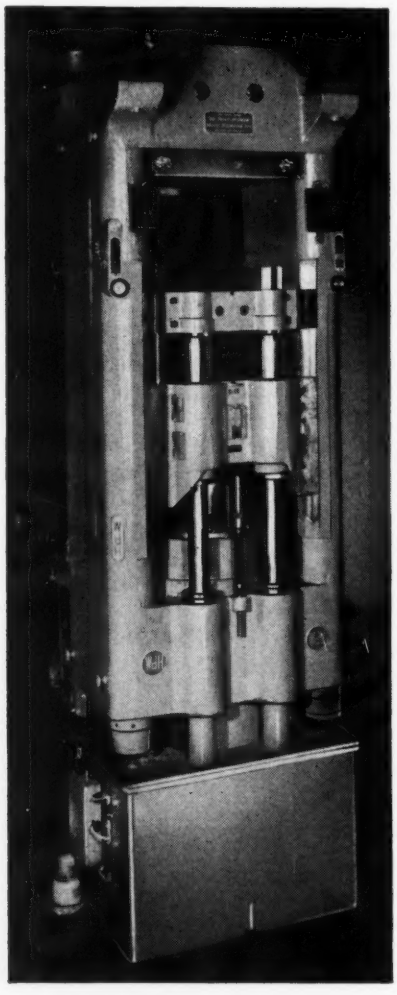
To obtain additional information on equipment described on this page, see lower part of page 212.

spindle through the action of a collet operated by a rotating air cylinder. The operator simply places the piece in the collet and presses two buttons, one of which automatically clamps the work while the other starts the machine cycle.

The machine will handle work up to 8 inches in diameter. With high-speed steel cutters, a speed of 125 surface feet per minute and a feed of 0.003 inch per tooth is ordinarily used, but the feed can be varied to suit requirements. 79

H-P-M Giant Size Double-Action Hydraulic Press

The Hydraulic Press Mfg. Co., 1042 Marion Road, Mount Gilead, Ohio, has recently built a double-action hydraulic press that has a capacity of 2000 tons and weighs 373,000 pounds. When installed, this press extends 29 feet above the floor level and requires a pit 10 feet deep to accommodate the lower part.



Giant size double-acting hydraulic press built by Hydraulic Press Mfg. Co.

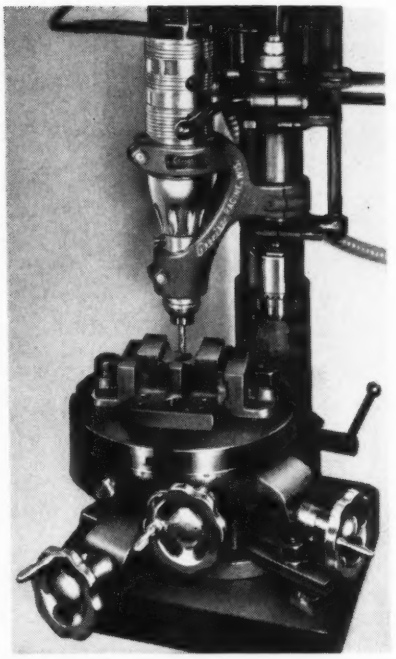
This huge press is capable of drawing sheet-metal parts to a depth of 24 inches, and it can be equipped with dies up to 72 inches square. In addition to the punch-carrying slide, having a capacity of 2000 tons, the press is equipped with a 600-ton hydraulic blank-holder and a 400-ton hydraulic die cushion. The blank-holder slide has provision for adjusting the pressure independently at each of its four corners, an important advantage when drawing irregular-shaped parts.

The press operator is protected by a safety control employing an electric-eye light beam which is projected across the front of the press at the operator's working level, the press becoming inoperative if the light beam is broken. Electric immersion heaters are provided for bringing the oil in the hydraulic pressure system up to temperature prior to starting the press, since the particular machine illustrated is to be used in France where adequate plant heating facilities for the winter months are not available. The variable-delivery radial piston type hydraulic pump with which the press is equipped is directly driven through a flexible coupling by a 200-H.P. electric motor. 80

"Precise Super 40" Grinding and Milling Portable Tool

The Precise Products Co., 1328-30 Clark St., Racine, Wis., has brought out a new "Precise Super 40" portable grinder-miller having a spindle speed of 45,000 R.P.M. and developing over 1/5 H.P., to succeed a former model. This tool can be employed with or without the Coolflex extension or in machine set-ups for operating mounted wheels up to 1 1/4 inches in diameter, unmounted wheels, cut-off wheels, and metal saws with special arbors up to 2 inches in diameter by 1/4 inch in width, using a speed control. High-speed midget mills and carbide "Micro Mills" up to 3/8 inch in diameter and 1 inch in width can also be accommodated .

New features include a precision-machined aluminum-alloy housing, micro-precision ball bearings, and increased rigidity and accuracy of quill and collet chuck. The air-cooled motor is protected from overload by easily replaceable "Fusetrons." The speed can be regulated by the control within a range of 15,000 to 45,000 R.P.M. A complete line of tools and accessories adapts this equipment for almost any set-up in standard machine tools. 81



Milling a hardened die with tungsten-carbide mill and "Precise Super 40" grinder-miller mounted on drill press

"Ucon" Lubricants

A new series of lubricants designated the "Ucon" brand has been recently placed on the market by the Carbide and Carbon Chemicals Corporation, Unit of Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y. The synthetic oils of this new line have excellent low-temperature properties, and are available in both water-soluble and water-insoluble grades. They have the important characteristic of not forming sludges which would interfere with or prevent proper lubrication.

Chemically, these lubricants are a series of synthetic organic chemicals of the polyether type which can be manufactured to any desired viscosity. They can be made specially to meet the requirements for general industrial lubrication; low-temperature lubrication; high-temperature lubri-

To obtain additional information on equipment described on this page, see lower part of page 212.

cation; textile lubricants and conditioners; hydraulic fluids; rubber lubrication plasticizers, softeners and solvents; and heat transfer media.

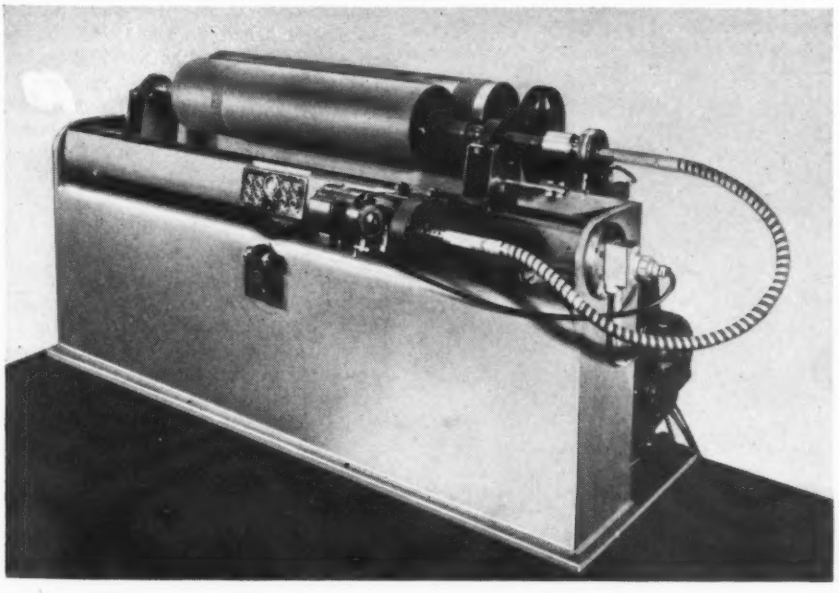
"Ucon" synthetic lubricants do not contain petroleum oils, and they are wax-free. They remain sludge-free for long periods, and change little in viscosity over wide ranges of operating temperatures. These lubricants also have little effect on most natural and synthetic rubbers. Water-soluble brands of the new lubricants are particularly adapted for use when the lubricant must be applied in one step of a manufacturing process and then removed before the next step. 82

Ryman Roll-Grinding Machines

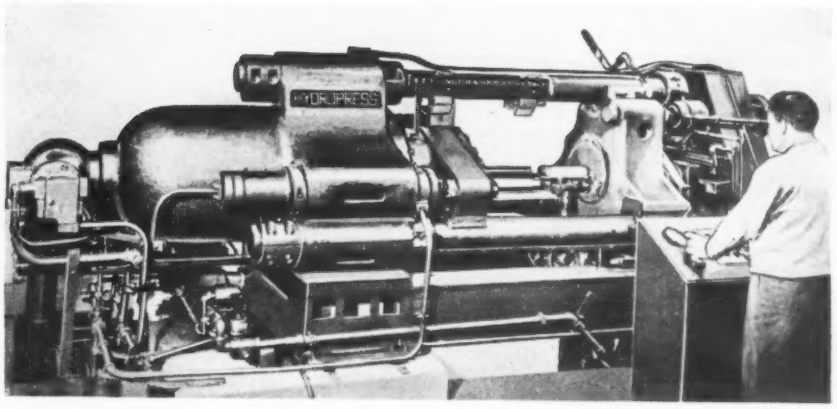
An integral roll-grinder incorporating an entirely new grinding principle, developed by Dr. R. G. Minarik and Eric Isakson of the Integral Engineering Services, Neenah, Wis., for the Kimberly-Clark Corporation, has been announced by the Ryman Engineering Co., Ellwood City, Pa., who now has the exclusive license to produce these machines and handle the roll grinding service. The new grinding principle, employing abrasive belts, has two applications. One is the "in-machine" integral grinder which is designed for grinding the rolls of large rolling machines such as are used in the paper and textile industries. With this type grinder, large calender rolls used in the manufacture of plastic sheeting can be ground without removal from the massive rolling machines. This equipment has been used successfully for grinding rolls used to turn out plastic sheets in thicknesses from 0.004 to 1/8 inch which are of uniform thickness within 0.0001 inch.

The other application of the new grinding principle—the "out-machine" integral grinder—is used in grinding rolls that can be easily removed from the rolling machines and brought to the grinder. A roll-grinding machine of this type is shown in the accompanying illustration.

Crowning or cambering of rolls can be performed in the new machines. Although the integral grinder is not provided with an adjustable crowning mechanism, it can be supplied in a form that will grind crowns of specified magnitude or shape. 83



Roll-grinding machine announced by the Ryman Engineering Co.



Oil-hydraulic extrusion press brought out by Hydropress, Inc.

Self-Contained Extrusion Press

A new type of oil-hydraulic extrusion press designed for rapid, economical production of rods and shapes from light metals and nonferrous alloys has been announced by Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y. This self-contained machine is built in 500- and 1000-ton capacities, and has a production rate of 50 to 60 billets per hour. It is especially adapted for the production of aluminum and other light metal extrusions, such as window sections, ladder sides, trim moldings, and ornamental and structural shapes. Rapid operation and accessibility for quick changing of dies facilitate the production of extruded shapes as needed, and save the cost of keeping such parts in stock. 84

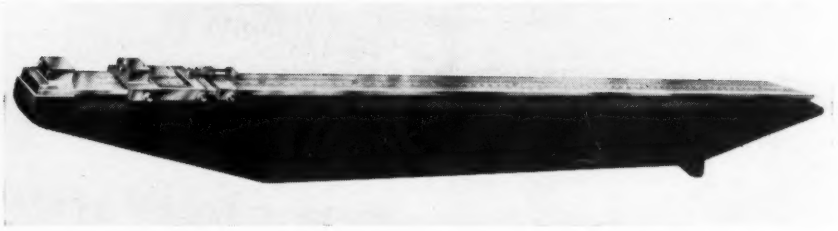
Shock Absorption Feature Incorporated in Chambersburg Drop-Hammers

The new Ceco-drop "boardless" gravity drop-hammer built by the Chambersburg Engineering Co., Chambersburg, Pa., embodies several unique features that are the result of an intensive study of shock and its effect on drop-hammer structures. Through the use of electronic measuring instruments, it has been possible to analyze the effect of the impact on a drop-hammer created when the hammer strikes and to study the resultant stresses.

This has led to the adoption of many shock absorption devices that protect vital parts of the machine. "Fabreeka" pads, for example, are used to dampen shock waves traveling upward through

To obtain additional information on equipment described on this page, see lower part of page 212.

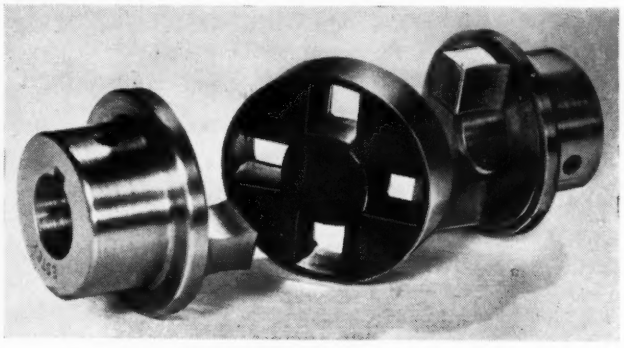
the hammer structure. A shock absorber somewhat similar to the automobile type is employed to absorb the shock transmitted through the valve operating mechanism of the tool. Certain pivot points in the mechanism are protected by rubber cushions. 85



Measuring machine with standard vernier slide gage brought out by the George Scherr Co., Inc.

Estey Flexible Coupling with Synthetic Rubber Spider

A steel-banded, synthetic-rubber spider is an important feature of a new articulated flexible coupling brought out by the Estey Co., 547 N. Main St., Canandaigua, N. Y. This coupling is designed to carry heavy loads under severe operating conditions. The large synthetic-rubber spider will withstand high temperatures and is oil-resistant. The steel retaining ring, molded and bonded to the spider, prevents distortion and rapidly dissipates heat generated by misalignment. The synthetic rubber provides maximum shock absorption, resists high torque, compensates for both parallel and angular misalignment, requires no lubrication, and is silent in operation. 86



Flexible coupling manufactured by the Estey Co.

Scherr Measuring Machine

The George Scherr Co., Inc., 199 Lafayette St., New York 12, N. Y., has announced a new measuring machine for external and internal measurements which is adaptable for use as a master checking unit and for determining extremely accurate dimensions on pin gages, standard bars, and end measuring rods. The measurements are obtained between hardened steel anvils. Flat jaws can be substituted for the round plug type anvils if desired. The precision steel scale is graduated in inches and in millimeters. The machine is available in two sizes, the No. 1 with a measuring range of 80 inches, and the No. 2 with a range of 120 inches.

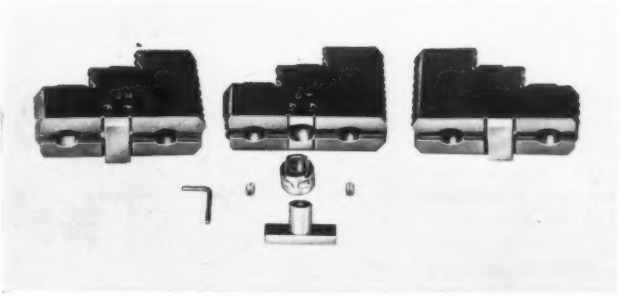
The slide carrying the vernier and measuring anvils is accurately fitted and has a fine adjustment screw. The vernier is 2.450 inches long, and permits accurate reading without magnifiers.

The No. 1 machine is 8 inches wide, 10 1/2 inches high, and 8 feet long. The No. 2 machine differs only in length from the No. 1 model being 11 feet long. These machines weigh about 300 and 400 pounds. 87

DoAll "Burr-Proofed" Gage-Blocks

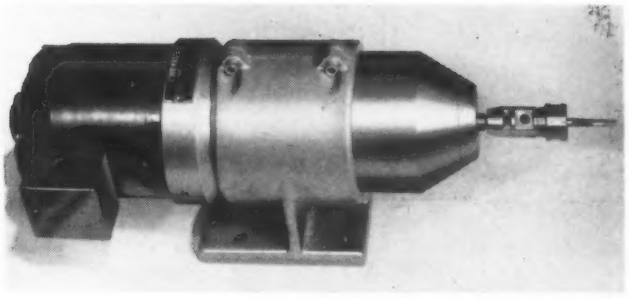
Gage-blocks on which a final precision operation is employed to remove all traces of burrs left by the final lapping to size of the flat gaging surfaces. These new blocks, announced by the Gage Division of the DoAll Co., Des Plaines, Ill., have the eight sides of the two parallel finish-lapped gaging surfaces smoothly blended into the radius-formed corners by a new finishing process developed in the DoAll laboratories. Thus the gages finished by this process have no burrs which can be raised by a slight tap or blow from a hard tool or object. Although the microscopic burrs left by the usual final lapping of the blocks do not affect the accuracy of the blocks so long as they remain undisturbed, a slight knock can easily raise them two-millionths inch or more. Even such a slight raising of the burrs is considered sufficient to render a gage-block unfit for making precision measurements. This possibility is eliminated in the blocks finished by the new process, which has no effect on the flatness or the accuracy of the gages and does not reduce the area of the gaging surfaces. It is claimed that this new feature will double the life of a set of eighty-three gage-blocks like the one illustrated. Measurement of hardness at the edge of the "Burr-Proofed" block is 65 Rockwell C, the same as on the gaging surface. 88

To obtain additional information on equipment described on this page, see lower part of page 212.



"Tru-Loc" Wear-Compensating Device for Scroll Chuck Jaws

"Tru-Loc" top-jaw adjustment device designed to lengthen the life of the jaws and scroll of universal chucks when they become worn through long service. The device consists of an eccentric bushing with screws which provide means for adjusting the top jaw as much as 1/32 inch. By manipulation of the two adjusting screws, the jaw can be trued up to compensate for wear on the threads of both the scroll and jaw. Designed to fit any American standard master jaw. Brought out by the Whiton Machine Co., New London, Conn. 89

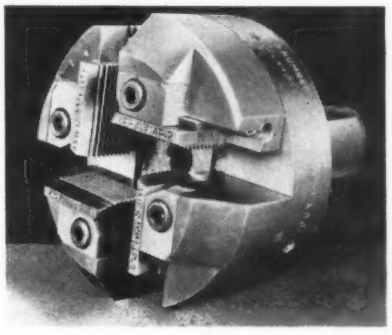


Precision Automatic Tapping Unit with Lead-Screw Control

Completely automatic tapping unit recently placed on the market by the Precision Thread Engineering Co., 2540 Park Ave., Detroit 1, Mich. This unit provides for automatic forward and reverse movement of the tap or threading die. It can be mounted in any position and operated from remote electrical controls. Any size tap or die from 0—80 to 3/8—16 can be handled. A hardened and ground lead-screw is employed to eliminate lead errors. This lead-screw controls the movement of the tap or die at all times. 90

Landis Adjustable Die-Heads

Die-head designed for use on automatic machines for threading street or service ells and similar cast-iron pipe fittings in 1/2- and 3/4-inch sizes where clearances are limited between the die-head and the machine. The diameter of the die-head is 3 3/4 inches and the chaser-holders are beveled at a 45-degree angle to provide greater clearance. A plus or minus



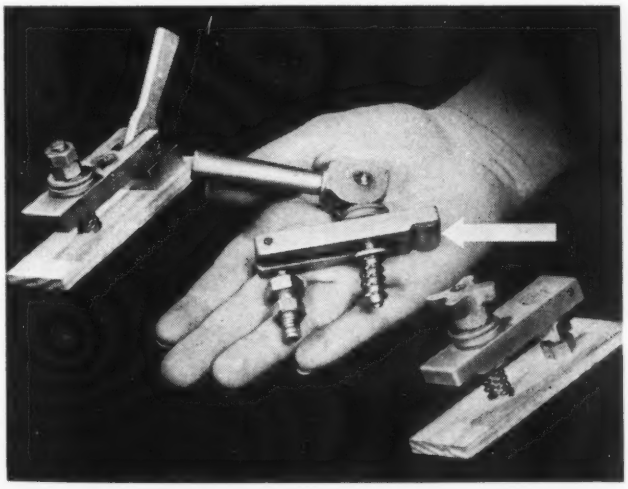
adjustment of approximately 1/32 inch on the pitch diameter is provided for each chaser-holder. Although the same body can be used, a different set of chaser-holders is required for each diameter. The length of the head depends on the type of mounting used. The head illustrated is driven by a square section on the shank, and is held in position by a draw-rod extending through the spindle. The head uses chasers 15/16 inch by 1 1/4 inches. Made by Landis Machine Co., Waynesboro, Pa. 91

Midget Type Clamps

New series No. 250 midget type clamps designed to hold small parts for machining operations. These clamps, announced by Noble & Stanton, Inc., 707 Broadway, Bedford, Ohio, are available in the three models illustrated, each of which has a different clamping arrangement. The major feature of the new clamps is the clamping toe, indicated by the arrow. This toe can be made of either soft alloy bronze or heat-treated, hard-chromed steel. The soft toe is designed to grip polished surfaces without marring them while the machining operations are being performed. 92

Electronic Comparator

Electronic comparator designed to provide accurate surface finish control of machine parts as quickly and easily as with routine dimensional checking. This new Pico surface comparator, announced by the Merz Engineering Co., Indianapolis, Ind., checks surfaces electronically against an approved sample, assuring instant and accurate meter readings. It can be easily used anywhere on the production line. The comparator is self-contained in an aluminum case having dimensions of 11 by 9 by 7 inches. The unit weighs approximately 15 pounds, and operates from 110-volt, 60-cycle outlet. 93



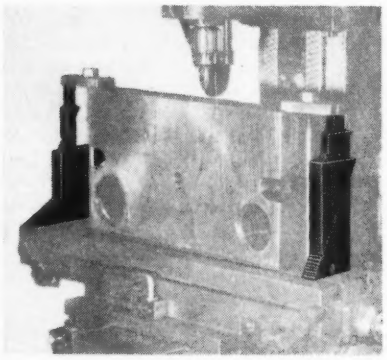
To obtain additional information on equipment described on this page, see lower part of page 212.

Ingersoll-Rand Large Size Impact Wrench

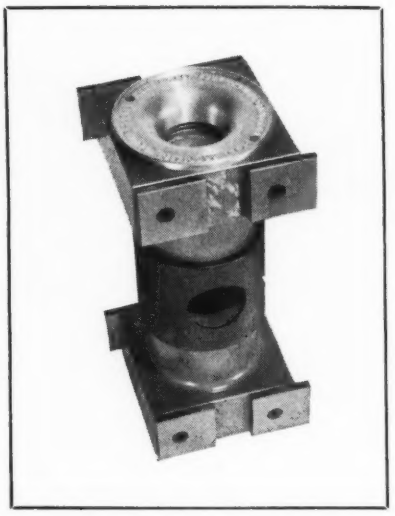
Impact wrench (size 577) designed for running on, tightening, or removing studs, bolts, nuts, and cap-screws with threads ranging in size from 1 1/4 up to 2 inches. This wrench operates on the rotary impact principle, by means of which the motor torque is converted into 1000 powerful rotary impact blows per minute. This wrench weighs only 72 pounds, its light weight being due largely to the extensive use of magnesium in the housings. Announced by the Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. 94

Clamp Support Blocks

"Po-Ro" clamp support blocks designed to make possible easier and faster set-ups in tool and die shops, as well as in machine and production shops. These blocks are made in three sizes with minimum heights of 1/2 inch, 1 inch, and 2 1/2 inches, and with maximum heights of 1 inch, 2 1/2 inches, and 6 inches, and are adjustable in increments of 1/16 inch. Any height can be obtained by placing two or more blocks on top of each other. The blocks are made of hardened steel, and have positive, slip-proof interlocking serrations and true flat bearing surfaces



which assure rigidity under severe stresses. Manufactured by the Podlin Tool Co., 3920 Wesley Terrace, Schiller Park, Ill. 96



Fell Precision Plumb-Level for Set-Up Work

Two precision level glasses are used in this tool, one for horizontal leveling and on for vertical or plumb leveling. The glasses are graduated in 0.0005 inch per foot spaces both ways. This provides a quick and accurate means of squaring vertical parts of a machine with the horizontal parts and will show precisely the amount of inclination in any direction. Bubble readings can be self-checked by turning the tool half way around. Developed by the William B. Fell Co., 320 McLain Ave., Rockford, Ill. 98

Multiple-Spindle High-Speed Drilling Head

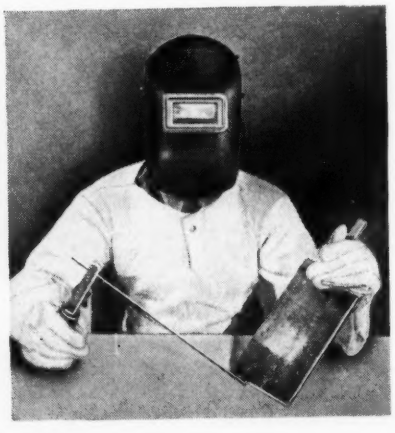
Multiple-spindle drilling head designed primarily for high-speed drilling, but also suitable for use on cluster boxes of way type machines. The thirty-four spindles in the 6-inch square area of the head illustrated have been operated at a speed of 10,000 R.P.M. with very little generation of heat. The head castings are made of aluminum alloy. Oil from a built-in pump provides lubrication for the bearings and gears. Announced by the U. S. Drill Head Co., Cincinnati 4, Ohio. 95

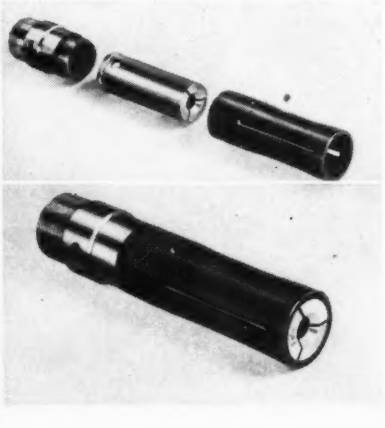
"Blinker" Welding Helmet

Welding helmet with movable "Blinker" lens that permits the welder to lower and raise the lens without raising the helmet by a simple movement of his chin against a pivoted strap. This arrangement leaves both of the welder's hands free, and thus facilitates all kinds of precision welding operations. Also permits welders to work safely in confined spaces, with no possibility of hot slag burning the face or injuring the eyes. Both head gear and chin rest are adjustable. Brought out by Welders' Products, Department 98, 141 W. Jackson Blvd., Chicago 4, Ill. 97

Sheffer Stock Pusher with One-Piece Insert

Improved type master stock pusher for automatic screw machines, developed by Sheffer Collet Co., Traverse City, Mich. The one-piece insert which replaces the separate segment pads previously used has several advantages which include ease of assembly; assurance of a more secure grip with less tension and pressure on the stock; and greater capacity. Available with one-piece inserts in file-hard steel, chrome-plated steel, nodular cast iron, high-strength bronze, and nylon. 99





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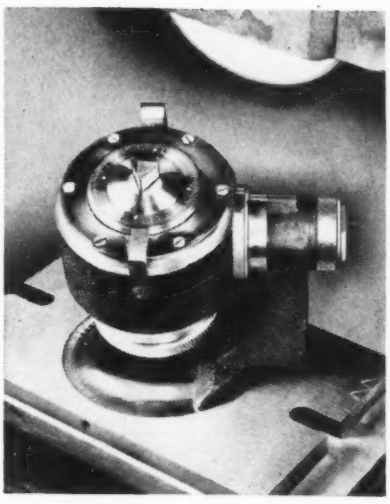


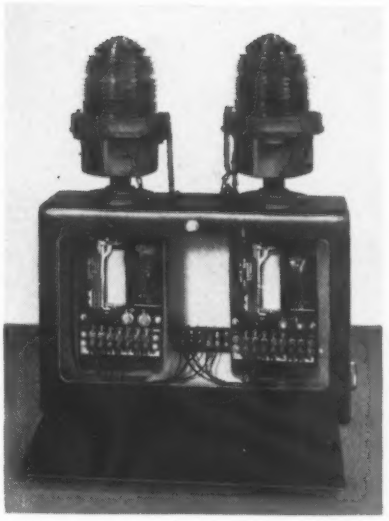
Fixture for Grinding Ejector-Tool Inserts

Fixture brought out by the Super Tool Co., 21650 Hoover Road, Detroit 13, Mich., for sharpening and grinding chip-breakers on the inserts for this company's "ejector" type tools. Provides ample clearance for grinding inserts with either flat or dished chip-breaker, and will duplicate any tool-grinding operation. Dials provide for accurate adjustment of the tool in any desired position, and cam index-plates facilitate grinding rectangular, square, and triangular inserts. Lifting of the indexing stop from its locating position permits grinding round inserts. The spindle has pre-loaded ball bearings, and is ground after assembly in the fixture to assure accurate alignment. Collets are available for standard sizes of all types of inserts. 100

Foot-Operated Remote Control for Cincinnati Shapers

Cincinnati "All Steel" shear equipped with electric clutch attachment actuated by foot-operated remote-control switch. Adapted for use when shearing wide or long sheets that would normally require an assistant to trip a conventional clutch lever. For such work, it is a simple matter to place the remote-control foot-switch at any convenient position for a single operator. The electric clutch control can also be furnished with two foot-switches and a selector for single- or double-operator

control. Where double control is used, both operators must depress their foot-switches in order to engage the clutch. Announced by the Cincinnati Shaper Co., Hopple, Garrard, and Elam, Cincinnati 25, Ohio. 101



P & W Signal for Electrolimit Continuous Gage

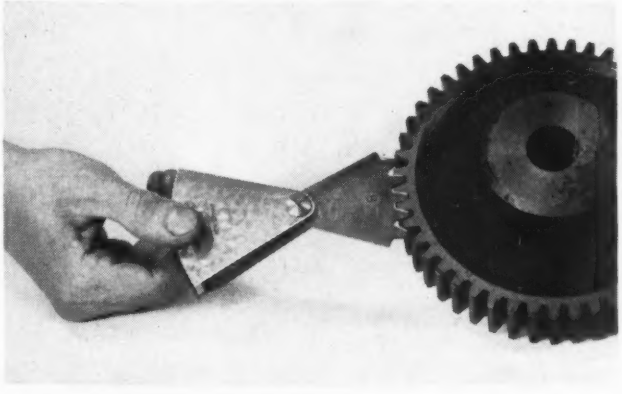
Self-contained light signal device for use with P & W Model D Electrolimit continuous gage. Announced by the Pratt & Whitney Division Niles-Bement-Pond Co., West Hartford 1, Conn. This light signaling device shows the operator of a rolling mill when the strip material is "off gage" at the continuous inspection line or shear. It can also be used to control an external circuit for size-classifying operations. The device consists of one red and one green lantern, two electronic relays, and a mounting case. The limits are set on the contact meter, and when the plus and minus limits are exceeded, an electric contact is made through the relays, thus providing a circuit for controlling mechanisms and lights. 102

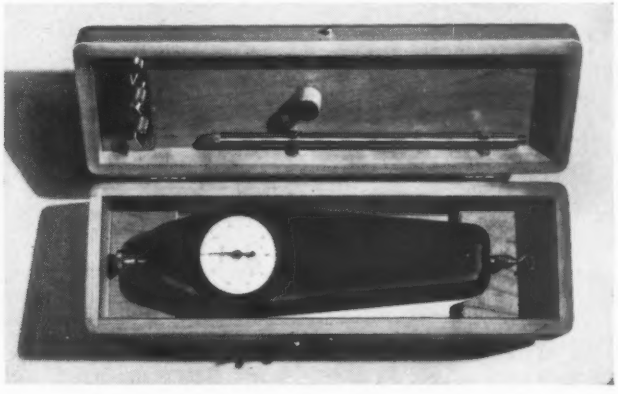
Scherr Templet Type Gear-Tooth Gage

Gear gage announced by the George Scherr Co., Inc., 199 Lafayette St., New York 12, N. Y., which is designed especially for shop use and can be carried in a tool-box or in the pocket. The twenty-three blades cover diametral pitches from 4 to 64, and are well protected against damage. The gear teeth are accurately generated to the correct 14 1/2 degree pressure angle involute shape. By the use of this gage, it is not necessary to count the teeth of a gear or measure the outside diameter to determine the diametral pitch. 103

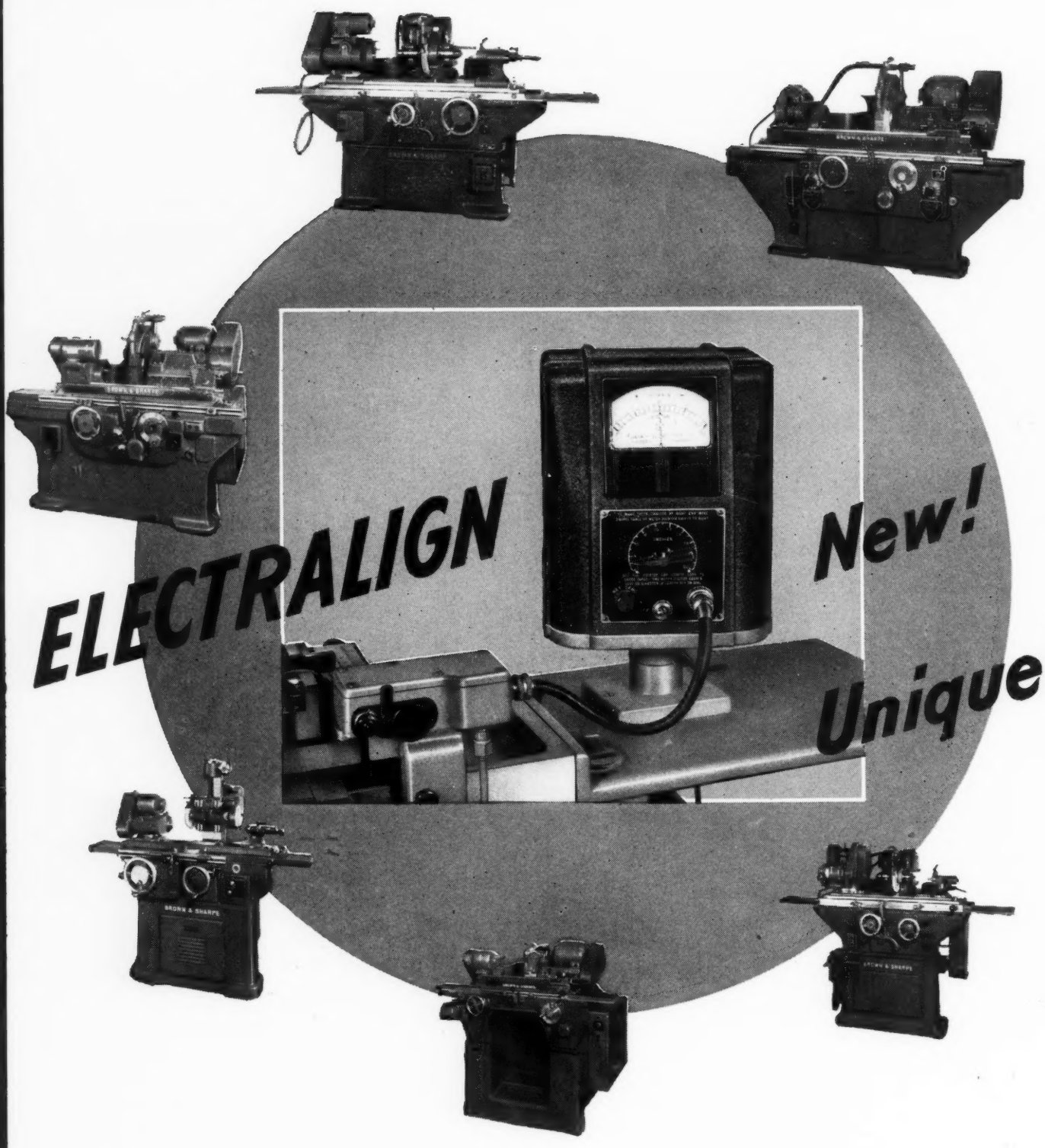
Portable Indicator for Measuring Forces

Force indicator developed to meet the needs of designers and engineers by the Hunter Spring Co., Lansdale, Pa. The precision compensated spring system facilitates making force measurements that are accurate to 1/2 graduation or 1/2 of 1 per cent of the full-scale reading of the dial indicator. Stainless-steel force-transmission rod attachments or fittings are provided for handling a wide range of work. Force measurements up to a maximum of 10 pounds can be made with this indicator. 104





To obtain additional information on equipment described on this page, see lower part of page 212.

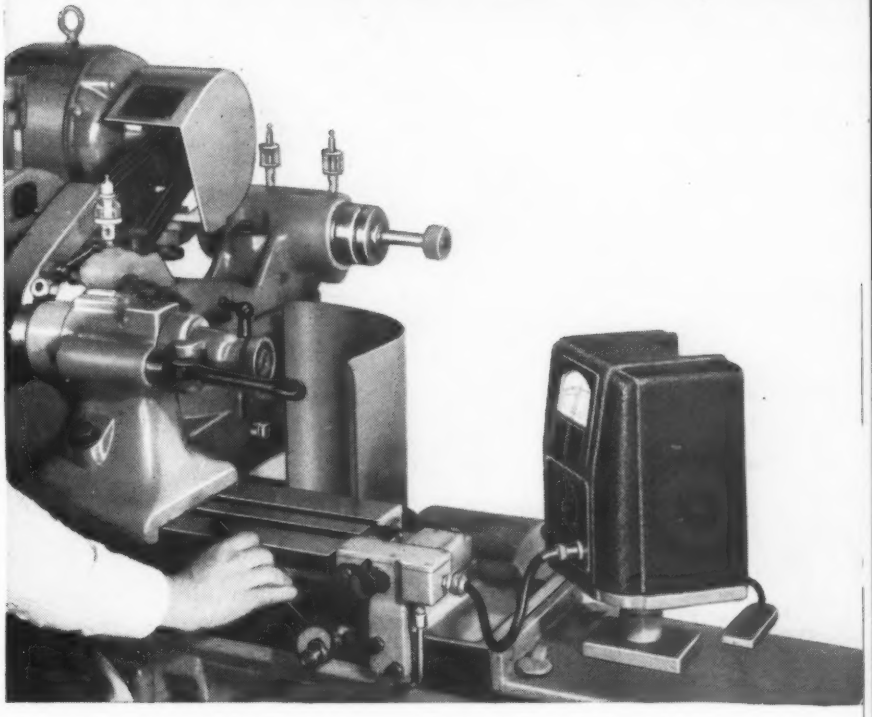


NOW AVAILABLE WITH THESE BROWN & SHARPE MACHINES

- **Nos. 1, 2, 3 and 4 Universal**
- **No. 5 Plain** (3″ x 12″ and 3″ x 18″)
- **No. 10 Plain** (6″ x 18″ and 10″ x 18″)
- **No. 12 Plain** (6″ x 30″ and 10″ x 30″)
- **No. 20 Plain** (10″ x 18″)
- **No. 22 Plain** (10″ x 36″)
- **No. 23 Plain** (10″ x 48″)
- **No. 13 Universal and Tool**

BROWN &

NOW—a revolutionary development to simplify grinding set-ups!



ELECTRONIC ALIGNMENT OF SWIVEL TABLE
on Cylindrical Grinding Machines

With an Electralign-equipped machine, the hardest part of grinding straight work and exact tapers is made easy and positive. This exclusive device permits the operator to align a swivel table fast and accurately after only one preliminary grind. It also permits correction during the grinding operation.

Electralign makes use of sensitive electrical resistance wire strain gages to detect swivel table movements and an electronic amplifier to magnify these movements. Deflections are direct reading . . . no interpolation or transposition of figures needed.

AVOIDS COSTLY CUT-AND-TRY OPERATIONS IN GRINDING STRAIGHT WORK AND EXACT TAPERS

With Electralign, there is no need of regrinding several test pieces in order to obtain proper adjustment. Displacements of as little as .0001″ are easily detected . . . and are amplified to well spaced graduations on the indicating scale. Only one setting is necessary for the correction.

PROVIDES CONTINUOUS VISUAL CHECK

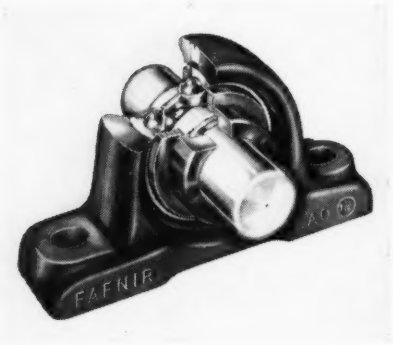
The Electralign acts as a "watchdog" . . . as grinding progresses, any deviation of instrument needle from zero warns operator that some jar or vibration has changed the setting of swivel table. It does much to eliminate costly spoiled work.

MANY COST-CUTTING ADVANTAGES

With Electralign, you can handle *more* straight and taper grinding . . . faster. You can reduce rejects . . . perhaps eliminate them altogether. You can remove the tension and pressure that usually goes with precision work. New operators can be trained much easier and faster. The extreme simplicity and reliability in operation of this arrangement makes it very practical for shop use. Write for complete details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

ALSO AVAILABLE: Brown & Sharpe Electralign-Comparator Selector allows use of comparator for external or internal measurements of finished work. Only one amplifier needed for electronic alignment plus measurement of work.

SHARPE B·S

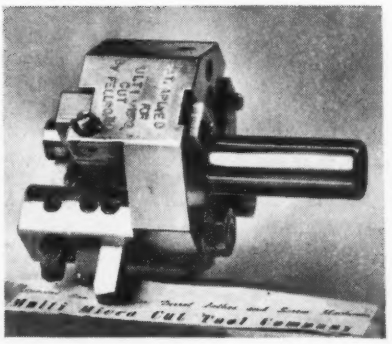


Fafnir Pillow Block

Pillow block of a new line equipped with "Mechani-Seal" ball bearings, announced by the Fafnir Bearing Co., New Britain, Conn. This line, designated the LAO series, is being produced in nine shaft sizes ranging from 1 3/16 to 2 15/16 inches. Each pillow block incorporates a heavy-series ball bearing with wide inner ring and self-locking collar which facilitates installation or removal of the bearing. A labyrinth type closure and an external slinger member throw off any contaminating matter when the shaft is operating at normal speed. A combination synthetic rubber and felt washer is incorporated in the seal for added protection at low speed or under adverse atmospheric conditions. 105

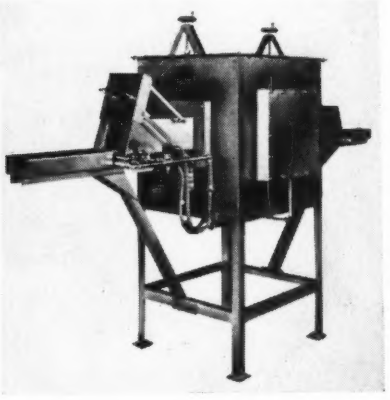
Quick-Opening Die-Head and High-Speed Steel Chasers

A new die-head designed for use on any pipe-threading machine having a capacity for threading pipe up to 2 inches in diameter has been placed on the market by the Peerless Machine Co., 1600 Junction Ave., Racine, Wis. Adapters are furnished for mounting this quick-opening die-head either vertically or horizontally. The vertical die-heads are interchangeable on individual machines, as are the horizontal heads. By having different die-heads for various pipe and bolt diameters, machines can be quickly set up for cutting any desired thread. The monotype high-speed steel chasers shown in the die-head are also a new development of the company. These fixed-length chasers can be easily reground, and are so designed that a single chaser can be replaced by a new one without disturbing any of the other chasers in the set. 106



Multi-Micro Cut Box-Tool

Box-tool of narrow design adapted for mounting on turret in limited space between other tools. This box-tool has a capacity of 1/4 inch to 1 1/16 inches, although the body is only 3 1/2 by 3 1/2 inches and the shank size 1 inch or 1 1/4 inches. The tool uses 3/8-inch bits, which are locked in a broached hole by set-screws. The two tool-arms are designed to permit a wide range of tool arrangements and to allow heavy cuts to be taken. For taper-turning operations a 3/4-inch tool bit, ground to the required taper, can be used in the slots provided for two of the 3/8-inch bits. Brought out by Multi Micro Cut Tool Co., 3106 Forty-Seventh Ave. S., Minneapolis, Minn. 108

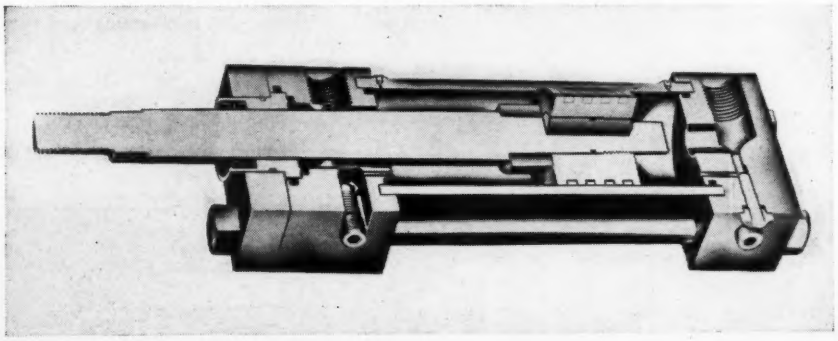


Electric Sintering, Brazing, and Annealing Furnace

New electric furnace (Model SNX), designed for use in sintering powdered metals, brazing, and bright annealing. Also adapted for use in metallurgical research work and various industries requiring electric furnaces with a normal heating range of 1400 to 2500 degrees F. and "flash" firing up to 2750 degrees F. The manual pusher of this "Globar" element furnace is designed for batch treatment on a straight-line, three-zone system. Work moves from purge, or preheat chamber, through high-temperature area, and then through water-cooled, cooling zone. Doors are counterbalanced and are equipped with automatically operated

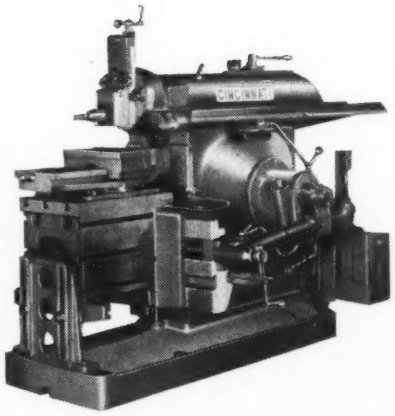
Miller High-Pressure Hydraulic Cylinders

High-pressure hydraulic cylinders with 10- and 12-inch bores of the design here illustrated have recently been added to the line of air and hydraulic cylinders, accumulators, air hoists, boosters, counterbalance cylinders, and similar equipment manufactured by the Miller Motor Co., 4027 N. Kedzie Ave., Chicago 18, Ill. These cylinders are available in single- and double-rod end styles and in a variety of piston and piston-rod seals for different applications. They are designed for operation at pressures of 2500 to 3500 pounds per square inch and are tested at 5000 pounds per square inch. 107



To obtain additional information on equipment described on this page, see lower part of page 212.

Shaping a BIG job...



Internal shaping bearing seats in this 5500-lb. steel plate to a tolerance of .001 indicates the accuracy and rigidity of Cincinnati Shapers.

The rapid and accurate metal removal, and the low-cost setup for shaping this 12′ steel plate on the sturdy Cincinnati table, give low-cost operation.

The unusual flexibility of change from job to job in minimum time and with minimum costs of tooling and fixtures also has made the Cincinnati Shaper the handy man of industry.

A versatile Cincinnati Shaper will be a busy and profitable machine in your shop.

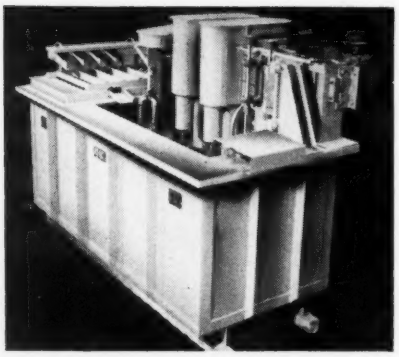
Write for Catalog N-5 for detailed description of the types and sizes of Cincinnati Shapers.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

flame curtains which prevent contamination of furnace atmosphere when doors are open. The high-temperature zone is 4 inches wide by 4 inches high by 12 inches long. Maximum power input is 15 K.W. Announced by the Pereny Equipment Co., 893 Chambers Road, Columbus 12, Ohio. 109

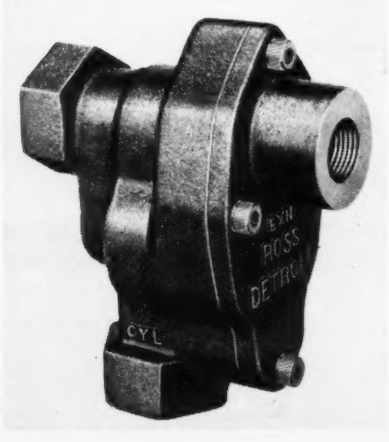


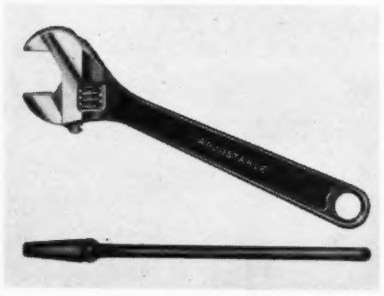
Ajax Isothermal Quench Furnace

Salt bath quenching furnace for "martempering" and "austempering" heat-treating processes, designed to assure rapid and uniform cooling of the work and to provide a simple, dependable method of extracting the high-temperature chloride salts carried over from the austenitizing bath. Made by Ajax Electric Co., Inc., Frankford Ave. at Delaware Ave., Philadelphia 23, Pa. 110

Ross Quick Exhaust Valve for Air Cylinders

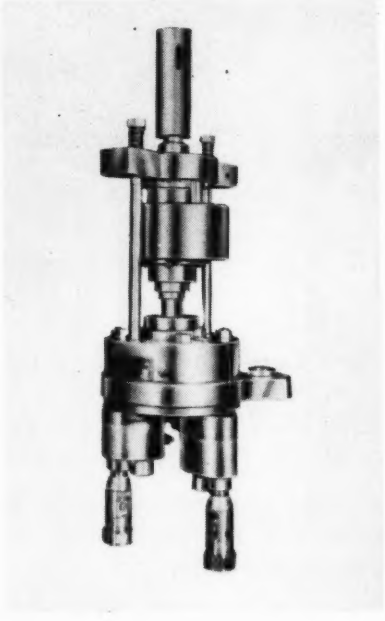
Auxiliary exhaust or "dumping" valve for air cylinders that provides for split-second starting of return strokes. When the regular valve is opened, it automatically causes the auxiliary valve to open. The latter valve, being located close to the cylinder, quickly "dumps" the exhaust air, and thus permits almost instantaneous starting of the return stroke. Available in 3/8- to 1-inch pipe sizes, inclusive. Announced by Ross Operating Valve Co., 120 E. Golden Gate, Detroit, Mich. 111





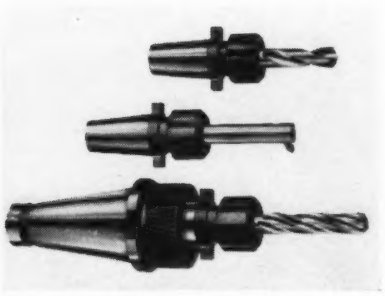
Williams Adjustable Wrench

New carbon-steel adjustable wrench brought out by J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y., which is thinner and lighter than previous models of similar capacity. The thin tapered jaws and unusual strength and toughness of this wrench have been obtained through improvements in design and material. The new wrench is made in 4-, 6-, 8-, 10-, 12-, 15-, and 18-inch sizes, with capacities from 1/2 inch to 2 1/16 inches. 112



Errington Adjustable Tapping Head

Completely new adjustable tapping head announced by Errington Mechanical Laboratory, Inc., Staten Island 4, N. Y. This tool has provision for a wide range of adjustments. It is fully geared, has needle bearings on all spindles in the head, and is provided with ball thrust bearings throughout. All parts are fully enclosed for protection and for pressure lubrication. This tapping head can be supplied with three spindles for equal adjustment in line, and with three, four, five, or six spindles for even spacing adjustment on bolt circles. 113



"Kwik Switch" Tool-Holder

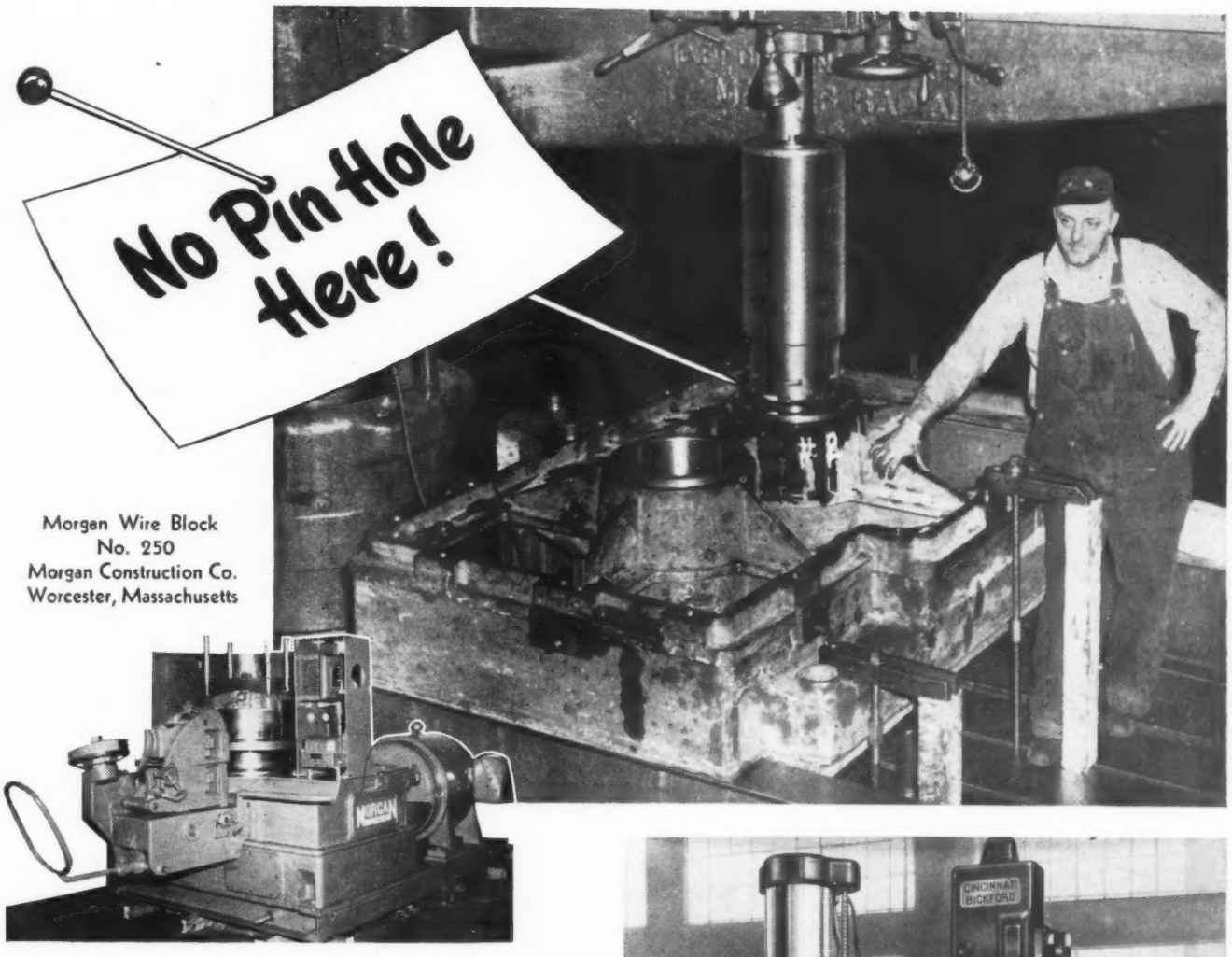
Tool-holder designed to permit rapid changing of tools used for work requiring multiple operations, such as drilling, tapping, and boring. With this "Kwik Switch" holder, changing of tools can be accomplished in less than ten seconds without loss of close tolerance accuracy. The master chuck fits the machine spindle, and the adapter chucks which hold the tools fit the master chuck, being firmly fastened in place by less than a quarter turn of a hand lock-nut. These holders handle tools with either straight or tapered shanks. Announced by the Universal Engineering Co., Frankenmuth 2, Mich. 114

"Disc-ette" Abrasive Finisher

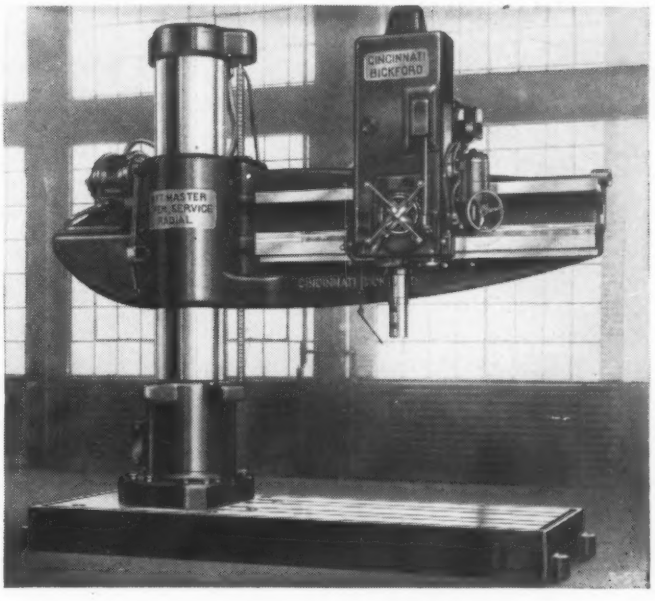
Hand type, electrically driven, rotary abrasive finisher available with utility kit for drilling, hole polishing, and similar operations. This finisher, known as the "Disc-ette," has been developed by the Craft Hollow Industries, Wallingford, Pa., to perform finishing operations for which larger and heavier tools cannot be conveniently employed. It is driven by a 1/15-H.P., 110-volt, 60-cycle alternating-current motor operating at 9000 R.P.M. or by a 150-volt direct-current electric motor. The tool speed is 4500 R.P.M. and the weight, 5 pounds. The light weight and shape of this tool permit it to be easily held in one hand. 115

To obtain additional information on equipment described on this page, see lower part of page 212.

No Pin Hole Here!



Morgan Wire Block
No. 250
Morgan Construction Co.
Worcester, Massachusetts



If your work is big, the Cincinnati Bickford Master Super Service Radial offers the power and rigidity that are definitely required. It is easily operated, and the centralized controls answer to a touch.

Highly accurate, with capacities far in excess of what today's cutting tools will stand, it handles unusually large castings economically and efficiently.

The 26" column, 12' arm, with forty horsepower, constant speed motor, is one of the largest Radial Drills built.

If your work is big—write for Bulletin R-22.

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE

Radials 7½" dia. col., 2½' arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio U.S.A.

GEAR PRODUCTION HIGHLIGHTS

No. 101

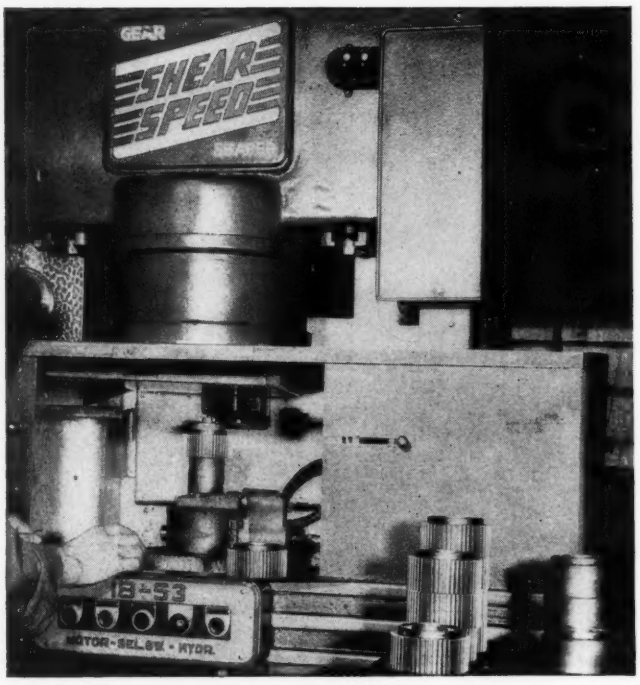
Cutting-Shaving-Checking-Lapping

MICHIGAN TOOL COMPANY
7171 E. McNICHOLS RD. • DETROIT 12, MICH.

SINGLE SPINDLE MACHINE CUTS 4-INCH GEARS IN 33 SECONDS EACH

With 2200 gears cut per tool grind—equal to over 100,000 gears per set of tools—a well-known gear producer is getting an average of 550 gears per shift from a single Michigan Shear-Speed gear shaper. The gears are 4-inch diameter, 51-tooth, $1\frac{1}{2}$ inch face. Floor to floor time is 45 seconds.

No coolant is used in cutting these high tensile iron gears*. Tools have a negative rake of 3°.

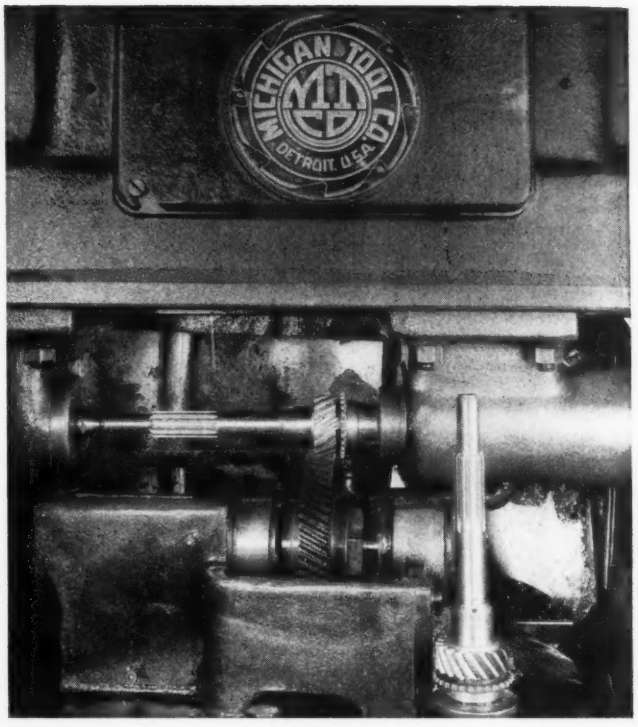


Tool design is such that four different gears—of varying face widths—can be cut on the same machine with the same tooling.

With the previous method of hobbing these gears, production from eight spindles was approximately 370 gears per shift. In addition, about 1 hour per day was required for tool sharpening.

*Higher outputs per grind can be obtained with straight cast iron gears.

For machine details, write Michigan Tool Company for Bulletin SS-48.



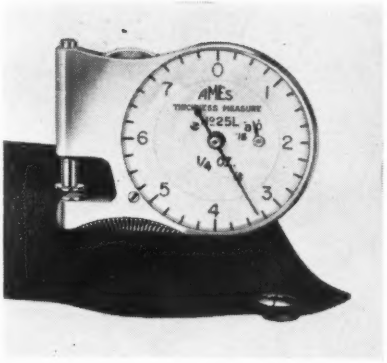
CUT FINISHING TIME IN HALF FOR TRUCK GEARS (now 32 seconds each)

"Underpass" shaving—in which the cutter travels back and forth just once—has not only cut overall tool cost per gear and eliminated cutter breakage on shoulder gears, but has reduced finishing time to only 32 seconds (floor-to-floor) per gear.

Typical of the gears (for a popular truck) being cut on these Michigan machines is a 17-tooth shoulder gear with 34° helix angle, 7.954 diametral pitch, 20° pressure angle, and pitch diameter of 2.137 in.

Material is SAE 4027, and the gears come to the "Underpass" shavers with between .006 and .008 in. stock, measured over pins.

For details of latest Underpass finishers, write Michigan Tool Company for Bulletin No. 870.



Ames Thickness-Measuring Instrument

Pocket-size dial instrument for determining thickness of leather, calibrated in ounces. Made by the B. C. Ames Co., Waltham 54, Mass. This instrument measures approximately 2 by 1 5/8 by 1/4 inch, and weighs 1 1/2 ounces. 116

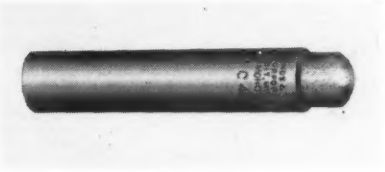
Haskins High-Speed Grinding Attachment

High-speed attachment developed by R. G. Haskins Co., 2651 W. Harrison St., Chicago 12, Ill., for speeding up grinding operations on dies and similar

work. The attachment steps up the speed delivered by the No. 2 and No. 4 Haskins flexible-shaft machines in the ratio of 2 to 1, giving the No. 2 machine a speed of 22,000 R.P.M. and the No. 4 machine a speed of 16,000 R.P.M. This grinding attachment is recommended for surface as well as for deep-cavity (up to 5 inches deep) grinding and polishing operations. It is especially well adapted for the grinding and polishing of welds in inaccessible places, and permits sensitive operation of small rubber and resinoid-bonded grinding wheels up to 2 5/8 inches in diameter. The belt will slip if the wheel becomes snagged, thus protecting the wheel and the operator. The belt guard also offers a convenient hand-hold for sensitive grinding. 117

Universal Diamond Dressing Tool

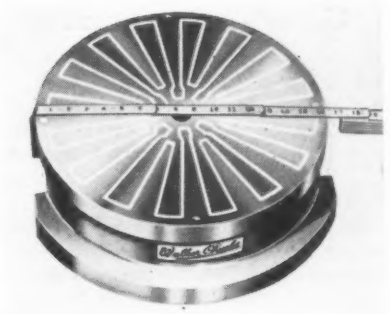
Universal diamond dressing tool announced by Diamonds & Tools, Inc., Department P, 19345 John R, Detroit 3, Mich. This tool is designed for both



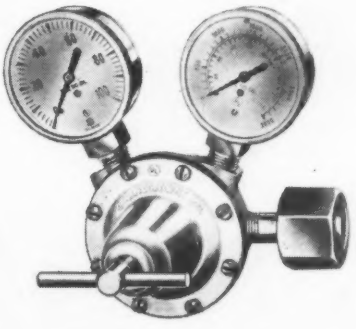
rough- and finish-dressing or truing of wheels on surface, cylindrical, or centerless grinders. It can be used on either aluminum-oxide or silicon-carbide grinding wheels of any bond hardness. Numerous small solid diamonds are evenly distributed throughout the special Colmonoy wear-resistant matrix of this tool. 118

Walker Large Permanent-Magnet Chuck

The O. S. Walker Co., Inc., Worcester 6, Mass., has just announced the addition of this 16-inch rotary permanent-magnet chuck to its line of work-holding equipment. The difficult problem of developing uniform lines of magnetic force over the entire surface of such a large chuck is said to have been accomplished by employing Alnico in the exact proportion to the mass of iron necessary to polarize the



complete surface and, at the same time, to polarize the magnets with equal amounts of force. 119

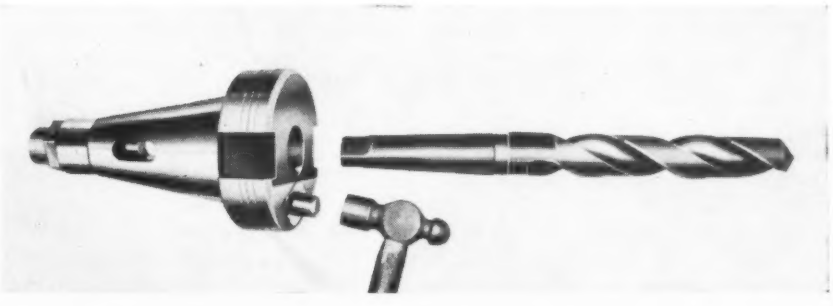


Norgren Acetylene Welding Regulator

Single-stage welding regulator for oxygen and acetylene, brought out by the C. A. Norgren Co., 222 Santa Fe Drive, Denver 9, Colo. This yoke type regulator is designed to assure maximum safety and positive delivery of oxygen and acetylene at correct pressures without creep, as well as to hold the secondary pressure while the tank pressure falls. 120

Taper Shank Adapter for Milling Machines

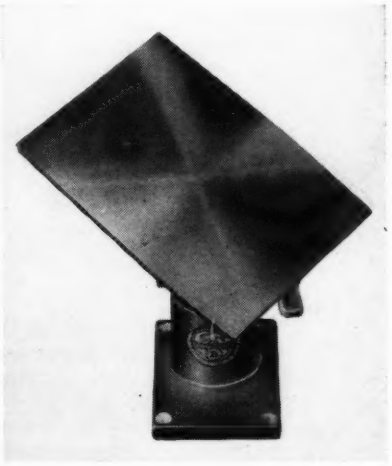
New Harding rotary adapter for milling machines, designed to permit quick changing of Morse taper-shank tools when performing milling operations. Ejection of tools is accomplished by simply tapping a release button on the face of the adapter. The quick, positive releasing action is obtained by a built-in hydraulic device. The adapter will fit any milling machine spindle and will hold any tool having a Morse taper shank. Other holders can be obtained for tools having either inside or outside taper or both inside and outside taper. Made by the Greenville Tool & Die Co., Greenville, Mich. ..121



To obtain additional information on equipment described on this page, see lower part of page 212.

"Cerro"-Alloy Pouring Heaters

One of two new models of "Cerro"-alloy pouring heaters recently added to the line of the Sta-Warm Electric Co., Ravenna, Ohio. These pouring heaters are designed specifically to meet the heating requirements of the low melting point alloys and have the approval of the manufacturer of "Cerrobend" and the other "Cerro" alloys. The heaters are also used for many other low melting point bismuth-base alloys, such as Wood's metal. The new models are made in 3- and 20-gallon capacities. Heaters having capacities of 5 and 10 gallons, as well as smaller sized units, are also available. The electrical heating units of these heaters produce low heat concentration and even heat distribution throughout the heating area, giving selective temperature control in the range of 100 to 300 degrees F. This heating range is sufficient for most low melting point alloys and eliminates the danger of overheating and the necessity for using water jackets. The pouring valve is locally heated to prevent "freezing" of the alloys as they are being poured. All pouring heaters of this line are available with leg type mountings such as shown in the illustration. A mounting for sling use is also available for movable units. 122



"Positionette" Work-Positioner

Light-weight, compact, self-contained work-positioner known as the "Positionette," manufactured by the Solon Foundry, Inc., 1510 University Road, Cleveland 13, Ohio. This positioner is built for use in machine shops, factories, and pattern shops. The table measures 4 by 5 3/4 inches, and will accommodate practically all sizes and shapes of work and work-holding fixtures within its capacity. It is made of heavy cast aluminum, stands 5 1/2 inches high, weights 1 1/2 pounds, and is adapted for use as a soldering base and angle-plate. 123

Tool for Assembling and Disassembling Roller Chains

Tool developed by Atlas Chain & Mfg. Co., Castor and Kensington Aves., Philadelphia 24, Pa., to facilitate assembling, disassembling, and repairing roller chains. This tool consists of an anvil, a fork, and a punch for use in driving out the chain pins. To disassemble a chain, the prongs of the fork are inserted between the side plates of the chain so that they span the two rollers containing the pins to be removed. The chain, supported by the fork, is then laid in the slot in the anvil, which is milled to suit the contours of the chain to prevent it from slipping. In this position, the pins can be easily removed by striking each one alternately until they are driven through the links. The tool can be used without the fork, in which case the chain rests on the floor of the slot while the pins are being driven into two holes through the base of the tool. Milled corners on the base of the tool permit it to be securely gripped between jaws of a vise. The tool is available in sizes that fit any standard roller chains. 124

To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described in this section is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning machine as described in May, 1949, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

Fill in your name and address on blank below. Detach and mail within three months of the date of this issue to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

NAME..... POSITION OR TITLE.....

[This service is for those in charge of shop and engineering work in manufacturing plants.]

FIRM.....

BUSINESS ADDRESS.....

CITY..... STATE.....

New Trade Literature

RECENT PUBLICATIONS ON MACHINE SHOP EQUIPMENT, UNIT PARTS, AND MATERIALS

To Obtain Copies, Fill in on Form at Bottom of Page 218 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the May, 1949, Number of MACHINERY

Cutting Costs with Welding

LINCOLN ELECTRIC CO., Cleveland 1, Ohio, is publishing a rotogravure news sheet entitled "It's Welding Time," the purpose of which is to present case histories on how operating and production costs have been reduced by the use of arc-welding. Copies can be obtained regularly without charge by those responsible for production if requested on a company letter-head directed to the Lincoln Electric Co., Cleveland 1, Ohio.

Flexible Metal Hose

CHICAGO METAL HOSE CORPORATION, Maywood, Ill. Catalogue G-50, containing 68 pages of data on the standard types of flexible metal hose made by this company, as well as expansion joints for piping systems, stainless-steel and brass bellows, and conduits. Copies available to those interested if requested on a business letter-head, addressed directly to the company, indicating position or title of writer.

Gage Handbook

SHEFFIELD CORPORATION, Dayton 1, Ohio. Catalogue FG-4849, containing 116 pages of information on fixed gages, including thread gages made to conform with the new unified screw-thread system. Prices, specifications, diagrams, and tables are given. Gage users can obtain a copy without charge by writing to the company at the address given above on business stationery.

Weight Calculator for Sheet Alloys

DAYTON ROGERS MFG. CO., 2824 13th Ave. S., Minneapolis 7, Minn. Slide-rule calculator for determining the weight of sheet and strip alloys in connection with stamping die practice. Available without charge by writing to the concern at the above address on a company letter-head.

Protective Finishes for Metals

MITCHELL-BRADFORD CHEMICAL CO., 2446 Main St., Stratford, Conn. Catalogue descriptive of the "Black-Magic" one-bath black-oxide process for producing a black finish on steel and iron, zinc, cadmium, copper, and brass. Complete instructions for the operation are given. Data is included on final protective film finishes, metal cleaners, and heat-treating materials. 1

Die-Casting Machines

CLEVELAND AUTOMATIC MACHINE CO., 4936 Beech St., Cincinnati 12, Ohio. Bulletins 200 and 400, describing, respectively, the Cleveland Models 200 and 400 universal high-pressure hydraulic die-casting machines, designed for the high-speed precision production of castings from aluminum, brass, and magnesium, as well as zinc, tin, and lead. 2

Rotary Adapters with Hydraulic Tool Ejection

GREENVILLE TOOL & DIE CO., 107 W. Benton St., Greenville, Mich. Bulletin illustrating and describing the new Harding rotary adapter with hydraulic tool ejection, designed for the rapid changing of tools on milling and boring machines. 3

Electronic Equipment

RELIANCE ELECTRIC & ENGINEERING CO., 1077 Ivanhoe Road, Cleveland 10, Ohio. Bulletin K-2125, describing the Reliance VSX full-wave electronic rectifier. Bulletin K-2051, on the Reliance VSP camber (edge) control for automatic guiding and positioning of sheet materials. 4

Drilling, Tapping, and Boring Machines

NATIONAL AUTOMATIC TOOL CO., Richmond, Ind. First of a series of folders entitled "Success Stories from the Brief Case of a Natco Field Engineer," presenting case histories of savings effected with multiple drilling, tapping, boring, and facing machines. 5

Profile-Measuring Microscopes

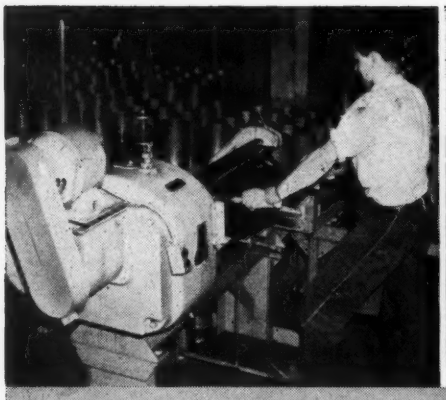
HAUSER MACHINE TOOL CORPORATION, Manhasset, N. Y. (Representative of HENRI HAUSER, LTD., Bienne, Switzerland). Bulletin illustrating and describing a microscope designed for the high-precision measuring and control of profiles. 6

Insert-Chaser Die-Heads

EASTERN MACHINE SCREW CORPORATION, 23-43 Barclay St., New Haven, Conn. Bulletin 14A, describing H & G Style DM insert-chaser die-heads designed especially for Brown & Sharpe automatic screw machines, including dimensions and capacities. 7

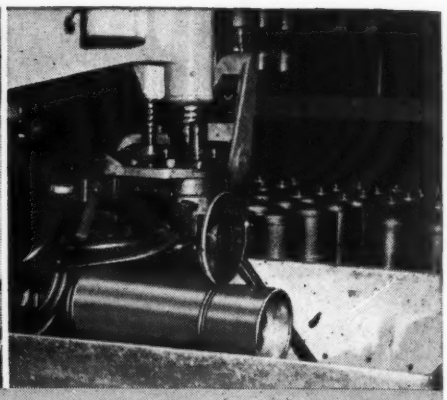
Air-Operated Presses

HANNIFIN CORPORATION, 1101 S. Kilbourn Ave., Chicago 24, Ill. Bulletin 251, giving detailed information on the operation and use of the new air-operated "Han-D" press, designed for production assembly, marking, riveting, and other light operations. 8



Rolling silicon bronze to the exact diameter before welding

Resistance welding of longitudinal seam



The bottom is resistance-welded to the shell

REVERE SILICON BRONZE IN RE-DESIGNED EXTINGUISHER

Everyone is familiar with the 2½ gallon fire extinguisher that is operated by turning bottom up. It is to be found in almost every factory, office and school. With it, countless fires have been put out, lives, property, jobs, money saved. Such a standard product tends to be taken for granted; most people naturally assume that it has reached its final perfection. Not so American-LaFrance-Foamite Corp., which some time ago decided to re-design its Alfco extinguishers in the light of the newest technological developments. To the user, the new extinguishers are definitely improved, being free from rivets, 4½ pounds lighter, and much more handsome. To the company, the product has been bettered in other ways, and is more efficiently produced.

Working out this extensive program required careful consideration of the relationships between design and materials, and materials, methods and machines. Alfco wished to abandon rivets and go to seam welding, among other things. Silicon bronze was selected as the material, because that can be easily resistance-welded, possesses strength of mild steel together with the corrosion resistance of copper. Revere and Alfco got together and jointly set up the time, temperature and pressure requirements for clean, sound welds. It was also necessary for Revere to establish the proper tempers for the body sheet so that it will more than withstand the Underwriters' pressure test, but still be formable into a cylinder with beads that locate the top and bottom domes. Similarly, tempers had to be selected for the sheet to be drawn into the domes. In all these and other activities the accumulated knowledge and experience of the Revere Technical Advisors, the welding section of the Research Department and of three Revere mills were used. Finally, the Research Laboratory tested the first production extinguishers to make sure that annealing practices were adequate.

Revere considers this an outstanding example of the benefits possible when a manufacturer and supplier collaborate on mutual problems. You are invited to consider Revere not only as a source of nonferrous metals, but of know-how in their selection and fabrication.

The new Alfco Extinguisher, made by American-LaFrance-Foamite Corp., Elmira, N. Y.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.

Sales Offices in Principal Cities, Distributors Everywhere.

Hard-Facing

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17, N. Y. Reprint of an article entitled "The Economies of Hard-Facing," discussing the advantages of the process and the correct selection of hard-facing rods; cost figures are included. 9

Low-Pressure Pneumatic and Hydraulic Cylinders

HANNA ENGINEERING WORKS, 1765 Elston Ave., Chicago 22, Ill. Catalogue 236, on low-pressure pneumatic and hydraulic cylinders, including dimensional drawings, construction features, capacities, and selection data. 10

Hydraulic Grinders

LANDIS TOOL CO., Waynesboro, Pa. Catalogue A-49, describing the company's 4-inch Type H plain hydraulic cylindrical grinders, including complete specifications. Special tooling and typical job setups are illustrated. 11

Automatic Oilers

TRICO FUSE MFG. CO., 2948 N. Fifth St., Milwaukee 12, Wis. Bulletin entitled "On the Job Proof," showing various actual installations of Trico visible automatic oilers and giving suggestions on correct application. 12

Stainless and Heat-Resisting Steels

JESSOP STEEL CO., Washington, Pa. Booklet dealing with Jessop stainless and heat-resisting steels, tool and die steels, and cast-to-shape steels, including typical analyses and applications. 13

Engineering Developments

ALLIS-CHALMERS MFG. CO., Box 512, Milwaukee 1, Wis. Annual review for 1948 of engineering developments of the company in the fields of power generation and distribution, metals, coal, petroleum, research, etc. 14

Pneumatic Presses

CLAYTON MFG. CO., 207 Delaware Ave., Buffalo 2, N. Y. Folder listing the outstanding features of Akrite air presses for assembling, staking, swaging, forming, and stamping operations. 15

Dynamometers

W. C. DILLON & CO., INC., 5410 W. Harrison St., Chicago 44, Ill. Bulletin D, illustrating thirteen applications of the Dillon dynamometer, a portable instrument designed to measure traction, tension, or weight. 16

Heavy-Duty Universal Hand Tapping Machines

PRODUCTO MACHINE CO., 990 Housatonic Ave., Bridgeport 1, Conn. Bulletin illustrating and describing the Producto universal heavy-duty hand tapping machine for tool-room and die shop use. 17

Grinding Wheel Dresser Guide

DESMOND-STEPHAN MFG. CO., Urbana, Ohio. Wall chart entitled "Desmond Dresser Guide," containing data on the selection and application of grinding wheel dressing tools. 18

Sling Chains

AMERICAN CHAIN DIVISION, AMERICAN CHAIN & CABLE CO., INC., York, Pa. Catalogue DH-80, containing 32 pages of data on ACCO registered sling chains, including specifications, applications, etc. 19

Reversible Plug Gages

SIZE CONTROL CO., 2500 W. Washington Blvd., Chicago 12, Ill. Catalogue 49, on the company's line of reversible plain and thread plug gages, centerless lapping machines, and tungsten-carbide and norbide gages. 20

Thickness-Measuring Instrument

SPERRY PRODUCTS, INC., Danbury, Conn. Bulletin 3700, describing the "Reflectogage," a portable, ultrasonic instrument for measuring the thickness of materials from one side only. 21

Solid Carbide Reamers

ATRAX CO., Francis Ave. and Day St., Newington 11, Conn. Bulletin A-62, containing data on Atrax solid-carbide reamers of new design, with an odd number of flutes and a radius relief chamfer. 22

Roller Chains

ATLAS CHAIN & MFG. CO., Castor and Kensington Aves., Philadelphia 24, Pa. Catalogue on construction and operating characteristics of Atlas roller chains, including specifications. 23

Lubricating Devices and Seals

GITS BROS. MFG. CO., 1846-66 S. Kilbourn Ave., Chicago 23, Ill. Price Guide and catalogue designed to facilitate the selection of lubricating devices, oilers, gages, and shaft seals. 24

Expanded Mesh Steel

JOSEPH T. RYERSON & SON, INC., Chicago 80, Ill. Bulletin giving engineering data and specifications on Ryex standard and flattened mesh types of expanded steel. 25

Power Hacksaws

SALES SERVICE MACHINE TOOL CO., 2363 University Ave., St. Paul 4, Minn. Bulletin on the Keller line of "Hy-Duty" power hacksaws with new adjustable feed control. 26

Pneumatic Chucks

CUSHMAN CHUCK CO., Hartford 2, Conn. Bulletin describing the operation and adjustment of "Accralock" air chucks with individual precision jaw adjustment control. 27

Powdered-Metal Fabrication

POWDERED METAL PRODUCTS CORPORATION OF AMERICA, 9335 W. Belmont Ave., Franklin Park, Ill. Booklet entitled "Powdered Metal in Your Production Picture." 28

Contour Cutting Machine

HEATH ENGINEERING CO., Fort Collins, Colo. Leaflet descriptive of the Heath contour cutter, designed to provide the versatility and accuracy of a pantograph machine at low cost. 29

Wrenches and Shop Tools

BILLINGS & SPENCER CO., 1 Laurel St., Hartford, Conn. Catalogue 49, containing 100 pages of information covering the complete line of "Vitalloy" wrenches and shop tools. 30

Hydraulic Controls for Pneumatic Equipment

BELLOWS CO., 222 W. Market St., Akron 9, Ohio. Bulletin HC-600, descriptive of Bellows "Hydro-Checks" for the control of air-powered equipment. 31

Hydraulic Weighing Cells

BALDWIN LOCOMOTIVE WORKS, Philadelphia 42, Pa. Bulletin 288,

describing and illustrating Emery hydraulic cells for general industrial weighing and special laboratory testing equipment. 32

Electronic Counters and Timers

POTTER INSTRUMENT CO., INC., 136-56 Roosevelt Ave., Flushing, N. Y. Folder descriptive of high-speed electronic counting, timing, and control instruments. 33

Nickeloid Pre-Plated Metals

AMERICAN NICKELOID CO., Peru, Ill. Folder containing actual samples of Nickeloid pre-plated metals, together with data on the sizes of sheets, coils, and flat strips available. 34

Clutches

CONWAY CLUTCH CO., 2745 Colerain Ave., Cincinnati 25, Ohio. Condensed catalogue containing data on Conway precision-built standard and disk clutches. 35

Reversible Plug Gages

PRATT & WHITNEY DIVISION NILES-BEMENT-POND CO., West Hartford 1, Conn. Bulletin describing P & W reversible cylindrical and thread plug gages....36

Carbide-Tipped Tools

SUPER TOOL CO., 21650 Hoover Road, Detroit 13, Mich. Folder describing the Super line of carbide-tipped tools for turning, boring, facing, and threading. 37

Cleaning Equipment

MAGNUS CHEMICAL CO., INC., Garwood, N. J. Bulletin 502-KR, describing the new "Krazy Dip Senior" cold-parts industrial cleaning machine. 38

Air Cylinders

MILLER MOTOR CO., 4027-33 N. Kedzie Ave., Chicago 18, Ill. Bulletin A-105, giving mounting and other data on the company's line of air cylinders. 39

Electrical Contact Rivets

GIBSON ELECTRIC CO., 8350 Frankstown Ave., Pittsburgh 21, Pa. Catalogue C-12, listing standard sizes of flat, crowned, and pointed electric contact rivets....40

Mounted Wheels and Points

SIMONDS ABRASIVE CO., Tacony and Fraley Sts., Philadelphia 37, Pa. Folder ESA-67, containing data on the company's line of mounted wheels and points. 41

Ball-Bearing Grinders

BALDOR ELECTRIC CO., 4351-67 Duncan Ave., St. Louis 10, Mo. Bulletin 321D, describing the company's newly developed 60 series ball-bearing grinder-buffer. 42

Welding-Rod Holder

EMPIRE MFG. CO., Box 1357, Spokane 5, Wash. Circular descriptive of the Schuchard rod-holder, and attachment for use on acetylene welding torches. 43

Abrasive-Belt Machines

STANDARD ELECTRICAL TOOL CO., 2500 River Road, Cincinnati 4, Ohio. Bulletin 70, covering the company's complete line of abrasive-belt machinery. 44

Metal-Cutting Tools

CHICAGO-LATROBE, 411 W. Ontario St., Chicago 10, Ill. Circular 51, on the company's line of drills, reamers, carbide tools and miscellaneous tools. 45

Air-Exhaust Muffler

ALLIED WITAN CO., 606 Williamson Bldg., Cleveland 14, Ohio. Circular on the newly developed "Atomuffler," a radial-flow air-exhaust muffler. 46

Reversible Thread Gages

SWEDISH GAGE CO. OF AMERICA, 8900 Alpine Ave., Detroit 4, Mich. Circular outlining the advantages of Model LL reversible thread gages. 47

Single-Phase Motors

LOUIS ALLIS CO., Milwaukee, Wis. Bulletin 722, descriptive of the new Type CN and Type CNC single-phase motors manufactured by the company. 48

Pneumatic Devices

BELLOWS CO., Akron, Ohio. Bulletin CL-15, briefly describing the line of "controlled-air-power" devices made by the company. 49

Gage-Blocks and Fixtures

WEBBER GAGE CO., 12900 Triskett Road, Cleveland 11, Ohio. Folder on Webber heavy-duty precision gage-blocks and fixtures. 50

Lock-Nuts

STOVER LOCK NUT & MACHINERY CORPORATION, Easton, Pa. Folder illustrating the design and applications of Stover lock-nuts. 51

To Obtain Copies of New Trade Literature

listed in this section (without charge or obligation), fill in below the publications wanted, using the identifying number at the end of each descriptive paragraph; detach and mail within three months of the date of this issue (May, 1949) to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

NAME..... POSITION OR TITLE.....

[This service is for those in charge of shop and engineering work in manufacturing plants.]

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By E.S.S.

BETWEEN GRINDS

Who is Snapper, What is He?

Subscribers are classified by MACHINERY according to occupation, for the purpose of our ABC report. Recently we received information from a man who describes himself as a snapper. Aside from the piscatorial denotation of the word, which would hardly apply, we are wondering what snappergory to put him in.

Elegy in a Toolyard

A strong, if silent, point in favor of apprentice training may be eked out of this letter received from a disabled veteran seeking information on techniques in his newly chosen trade: "I work days and attend classes at night at a local junior college, all in the pursuit of becoming a good tool engineer. I am employed by an old established firm which specializes in drawing, beading, thread rolling, etc. However, most of the know-how has passed away with the old toolmakers who mastered the problems presented by this type of work. We find ourselves in a very embarrassing position now, one in which lack of knowledge of these techniques has been very discouraging."

A Plum

With aplomb it is true that on this page we alter words to suit the occasion, but we are surprised when others do it. In a roundabout way we are thus referring to the first issue of the magazine sponsored by the Magnesium Association, entitled "MagNewsium."

Safe Rather than Sorry

Uncle Sam played ghost to the machine tool industry recently by sending out a batch of phantom war orders for machine tools. The industry which was selected first in a survey that will eventually cover all industries important to the national defense cooperated wholeheartedly by estimating its capacity for fulfilling these do-but-don't orders (do let us know but don't act).

Seventeenth Inning Coming up

Keeper of the scoreboard (in the spring our fancy turns to baseball) reports that sixteen issues of Bernard Lester's Sales Engineer articles are available in reprint form, the complete battery so far, upon request. Just added to his long list is the A/S Narvesens Kioskkompani of Oslo, Norway. A kiosk is a newsstand, and this Scandinavian company supplying books and periodicals corresponds to our American chains of news companies. You know—the Korner Kiosk.

Latin Unconcern

A typographical slip resulted in our publishing an Ingenious Mechanisms article with the South American contributor's given name spelled "Ferderico" instead of "Federico." Upon apologizing to the author, we received a chivalrous reply: "It doesn't matter the small error in my name; one letter more, one letter less, doesn't make much difference."

Piecing a Picture of EDWIN F. MOSTHAF—If you knew that a certain man was a member of the American Society of Tool Engineers, American Military Engineers, the American and British Ceramic Society, and a Fellow of the British Royal Society for Arts and Sciences, you could draw a rough sketch of that man's career in industry. The man in the case is Edwin F. Mosthaf, one of MACHINERY'S contributors (see the article on page 180). To fill in the picture, here are some details. As a boy with mechanical aptitude living in Michigan, young Mosthaf naturally chugged into the automotive industry. Later, as a licensed engineer he de-

signed and developed single-purpose machinery and tools for the big Detroit manufacturers, including special machinery for the spark plug industry. After about twenty years of this, he switched his interests. Now residing in New Jersey, Mr. Mosthaf specializes on design and methods for forming and sintering parts made from metallic and non-metallic powders for use in the automotive, radio, and home appliance industries. For diversion, Mr. Mosthaf occupies himself with two more varieties of license—one for flying and the other for fishing—being as adept at handling big birds (inanimate) as little fish (animate).

News of the Industry

Richard J. Conroy, newly appointed district manager of the Whitman & Barnes' Los Angeles office

California

RICHARD J. CONROY has been appointed district manager of the Los Angeles, Calif., branch office and warehouse of Whitman & Barnes, Detroit, Mich., succeeding E. L. Foreman, who died suddenly last February. Mr. Conroy has been sales and service engineer for the company in the Chicago district since 1944. He was previously employed in a similar capacity by the Independent Pneumatic Tool Co.

Colorado and Oregon

ALLEN-BRADLEY Co., Milwaukee, Wis., has appointed the YOUNG ELECTRIC MFG. & SUPPLY Co., 2134 Curtis St., Denver 2, Colo., representative for the line of electric motor controls made by the company.

ALFRED I. STUART has been appointed head of the methods engineering department of the Hyster Co., Portland, Ore., manufacturer of industrial trucks and tractor equipment.

Illinois and Tennessee

W. A. JONES FOUNDRY & MACHINE Co., Chicago, Ill., manufacturer of speed reducers and transmission products, announces the following promotions: JOSEPH A. MARLAND, who has been handling sales in the Chicago territory has been made sales manager; THOMAS A. JONES has been appointed assistant sales manager; and JOSEPH A. GUYER has been named advertising manager.

JOHN PAUL AHERN has been made executive director of the National Foundry Association, 120 S. LaSalle St., Chicago 3, Ill., and EDWARD E. FRIES has been promoted to the position of field secretary. Mr. Ahern was formerly on the executive staff of the Manufacturers Association of Connecticut.

WACKER SALES Co., 35 E. Wacker Drive, Chicago 1, Ill., has been appointed midwestern sales representative for the "Imicro" internal micrometers made by the Tesa Corporation of Switzerland, manufacturer of precision instruments.

ANDREW J. BIRCH is now in charge of the Chicago, Ill., office of the Ward Steel Co., Boston, Mass. He was formerly at the Providence, R. I., office of the company.

BOWDITCH & Co., factory representative of the Allen-Bradley Co., Milwaukee, Wis., announces the opening of a new office at 1350 Monroe Ave., Memphis, Tenn., with FRANCIS BOWDITCH in charge.

Michigan

DOW CHEMICAL Co., Midland, Mich., announces the following changes in its executive staff, made as the result of the recent death of DR. WILLARD H. DOW: EARL W. BENNETT, treasurer of the company since 1930, has been elected chairman of the board, and LELAND I. DOAN has been elected president. Mr. Doan has been a vice-president since 1938 and secretary since 1941. DR. MARK E. PUTNAM, a vice-president since 1942, was named general manager. Dr. Dow had formerly held all three of the positions mentioned, but in recent years had abandoned the titles of chairman of the board and general manager. The following new vice-presidents were named: DR. A. P. BEUTEL, general manager of the Texas Division, and RUSSELL L. CURTIS, general manager of the Great Western Division. CARL A. GERSTACKER was elected treasurer, and CALVIN A. CAMPBELL, secretary.

FRANK L. DECAVITTE has been appointed factory manager of the Plymouth plant of the Chrysler Corporation, Detroit, Mich., and GEORGE H. RUMFORD, JR., has been made superintendent of the Evansville, Ind., plant, the position previously held by Mr. DeCavitte.

LEO P. GAJDA has been promoted from the position of chief draftsman to director of engineering for the Snyder Tool & Engineering Co., Detroit, Mich. He succeeds GEORGE D. MELLING, who has resigned to form his own company in partnership with HOWARD MCCOY. The new company, to be known as MCCOY-MELLING, will represent the Snyder Tool &

(Left) Leland I. Doan, new president of the Dow Chemical Co. (Right) Dr. Mark E. Putnam, newly appointed general manager

REVISED TEMPER SUFFIXES FOR ALUMINUM ALLOYS—2

Wrought Aluminum Alloy (Heat-treatable)	Old Temper Suffix	New Temper Suffix									
		Sheet and Plate[1]				Extrusions[1]		Wire, Rod, and Bar[1]	Tubing (1) (3)		Forgings[2]
		Flat Sheet	Coil	Plate	Forms						
		Heat-treated by Supplier	Heat-treated by Supplier	Heat-treated by Supplier	Heat-treated by Customer	Heat-treated by Supplier	Heat-treated by Customer	Heat-treated by Supplier	Heat-treated by Supplier	Heat-treated by Customer	Heat-treated by Supplier
11S	W T3 T8							–T4 –T3 –T8			
14S and Clad 14S[6]	W T T	–T3 –T6	–T4 –T6	–T4 –T6	–T4 –T6	–T4 –T6	–T42 –T62	–T4 –T6			–T4 –T6 –T61[4]
17S	T							–T4			
18S	T										–T61[4]
24S and Clad 24S[6]	T RT T80 T81 T86	–T3 –T36 –T81 –T86	–T4 –T6 	–T4[7] –T36 –T86	–T4 –T6 	–T4	–T42	–T4 –T36	–T3	–T4	
25S	T										–T6
32S	T										–T6
A51S	W T										–T4 –T6
53S and R353	W T T5					–T4 –T6 –T5	–T4 –T6				–T4 –T6
61S and R361	W T T5 T62 T7 T81	–T4 –T6	–T4 –T6	–T4 –T6	–T4 –T6	–T4 –T6 T5 –T62	–T4 –T6	–T4 –T6 –T91 –T81	–T4 –T6	–T4 –T6	
63S	T T5					–T6 –T5	–T6 –T5				
75S and Clad 75S[6]	W T	–W[5] –T6	–W[5] –T6	–W[5] –T6	–W[5] –T6	–W[5] –T6	–W[5] –T6	–T6			
Clad R301[6]	W T	–T3 –T6	–T4 –T6	–T4[7] –T6							
R317	T							–T4			

[1]Also available in –O and –F tempers.
[2]Also available in –F temper.
[3]For extruded tubing, see "Extrusions."
[4]Boiling water quench.
[5]To be specific, time of aging should be shown in parentheses after temper.
[6]Available only in sheet and plate.
[7]Reynolds plate, heat-treated by customer, is designated –T42.

REVISED TEMPER SUFFIXES FOR ALUMINUM ALLOYS—1

Temper Suffix	Explanation	Temper Suffix	Explanation
–F	As fabricated; not thermally treated or intentionally strain hardened.	–T	Thermally treated to produce stable tempers other than –F, –O, or –H.
–O	Annealed, recrystallized. Softest temper of wrought alloy products.	–T2	Annealed (cast products only).
–H	Strain hardened, with or without supplementary thermal treatment.	–T3	Solution heat-treated and then cold-worked to improve strength.
–H1	Strain hardened only, plus number indicating degree of hardening.	–T4	Solution heat-treated and naturally aged.
–H2	Strain hardened and then partially annealed, plus number indicating degree of strain hardening remaining after annealing.	–T5	Artificially aged only, without prior solution heat-treatment.
–H3	Strain hardened and then stabilized, plus number indicating degree of strain hardening remaining after stabilizing.	–T6	Solution heat-treated and then artificially aged.
–W	Unstable condition following solution heat-treatment.	–T7	Solution heat-treated and then stabilized.
		–T8	Solution heat-treated, cold-worked, and then artificially aged.
		–T9	Solution heat-treated, artificially aged, and then cold-worked.
		–T10	Artificially aged and then cold-worked.

TEMPER DESIGNATIONS FOR NON-HEAT-TREATABLE ALUMINUM ALLOYS*

Aluminum Alloy	Old Temper Suffix	New Temper Suffix		
		Strain Hardened Only	Strain Hardened and Partially Annealed	Strain Hardened and Stabilized
2S and 3S	1/4H 1/2H 3/4H H Extra Hard (Non-Standard)	–H12 –H14 –H16 –H18 –H19	–H22 –H24 –H26 –H28	
4S† 52S† and 56S†	1/4H 1/2H 3/4H H Extra Hard (Non-Standard)			–H32 –H34 –H36 –H38 –H39

*Also available in –O and –F tempers.
†These alloys may also be obtained in the –H1 and –H2 tempers.

Leo P. Gajda, new director of engineering for Snyder Tool & Engineering Co.

Engineering Co. throughout Michigan, excluding the Detroit metropolitan area. ELWOOD M. KIEFER will take Mr. Gajda's place as chief draftsman.

CHARLES H. BESLY & Co., Chicago, Ill., has announced the opening of a new office at 7376 Grand River Ave., Detroit 4, Mich. E. W. HUTCHINSON will be in charge of the grinder and abrasive divisions, while J. E. WHITE will be in charge of tap sales at the new office.

VERNON H. OLSON has recently been appointed general sales manager for the W. O. Barnes Co., Inc., Detroit, Mich., manufacturer of hacksaw and band-saw blades. In his new position, Mr. Olson will work with the firm's distributors and will be in charge of advertising. Prior to his present connection, he was works manager for the DoAll Co., Des Plaines, Ill.

Vernon H. Olson, recently appointed general sales manager of W. O. Barnes Co.

STANDARD REAMER & TOOL CO., manufacturer of reamers, cutters, and special tools, will be known hereafter as the SPECIAL CUTTER & TOOL CO. The headquarters of the company have been removed to 401 Salliotte St., Ecorse, Mich.

SNYDER TOOL & ENGINEERING CO., Detroit, Mich., who recently purchased the ARTHUR COLTON CO., announces the following officers for the Colton company: CLARENCE SNYDER, chairman of the board and vice-president; HOWARD N. MAYNARD, president and treasurer; K. B. HOLLIDGE, executive vice-president and secretary; ALFRED W. KATH, director of engineering; and NELSON CARMAN, director of sales.

K. B. Hollidge, executive vice-president and secretary of Arthur Colton Co., subsidiary, Snyder Tool & Engineering Co.

New England

ROBERT A. SMITH has been promoted to the position of sales manager of the Hy-Pro Tool Co., New Bedford, Mass., a division of the Continental Screw Co. Prior to this appointment, Mr. Smith was in the sales department, working in the field.

SHERMAN R. THAYER has been elected treasurer and director of the Parkwood Corporation, Wakefield, Mass., manufacturer of high-pressure laminated plastics applicable in the industrial, electrical, and other fields.

Sherman R. Thayer, newly elected treasurer and director of Parkwood Corporation

H. C. HOOK CO., INC., 340 Main St., Worcester, Mass., has recently been appointed representative in the states of Massachusetts, Rhode Island, Vermont, New Hampshire, and Maine for the line of lathe chucks, gear-cutters, centering machines, and special-purpose high-production milling machines made by the Whiton Machine Co., New London, Conn. The VANDYCK CHURCHILL CO., 42 Church St., New Haven, Conn., has been made representative for this line in the state of Connecticut.

WALTER A. STEWART, former vice-president of the American Optical Co., Southbridge, Mass., has been elected president, to succeed GEORGE B. WELLS, who has resigned after twelve years' service.

UNION TWIST DRILL CO., BUTTERFIELD DIVISION, Derby Line, Vt., manufacturer of taps, dies, reamers, and other tools has recently appointed JOHNSON-DEVOU, INC., 58 Brookline Ave., Boston, Mass., distributor for the company in Boston, Worcester, and Springfield

E. HORTON & SON CO., Windsor Locks, Conn., announces the following appointments: JOSEPH L. LYNCH, advertising manager; PAUL E. DILLBERG, superintendent of the Drill Chuck Division; and STEVEN J. LUDWIN, superintendent of the Lathe Chuck Division.

J. B. CAREY, formerly sales manager of the A. F. Holden Co., New Haven, Conn., has been made vice-president in charge of research and chemical manufacture; he is succeeded as sales manager by C. R. HECKER.

New Jersey

FRANK A. WEISS has been made assistant to the general manager of Hyatt Bearings Division, General Motors Corporation, Harrison, N. J. Mr. Weiss was formerly general purchasing agent, and is succeeded in that position by LEO V. FARRELL, assistant purchasing agent.

ARTHUR C. HELLER has been elected president of Heller Brothers Co., Newark, N. J., manufacturer of files and other hand tools, as well as tool steel, succeeding the late Paul Heller. JAMES G. HENRY, JR., has been elected vice-president and secretary.

New York

F. H. APPENREDT, for many years office manager of the Pittsburgh district sales office for the Carborundum Co., Niagara Falls, N. Y., has resigned and is succeeded by H. P. ERBE, office manager at Cleveland. R. L. HEIMSTADT, assistant office manager at Detroit, has been promoted to the position of manager of the Cleveland office. D. S. MASSON, manager, sales administration, at the home office, has been promoted to the position of assistant to the district sales manager in Detroit, and is succeeded by J. H. DENTON.

PHILIP FINALE has joined the Loewy Construction Co., Inc., Rolling Mill Division of Hydropress, Inc., New York City, as chief engineer. Mr. Finale had been associated with the Mesta Machine Co. since 1928.

HARDINGE BROTHERS, INC., Elmira, N. Y., announces that the Rochester office of the company has been moved to larger quarters at 491 Main St., E., Rochester 4, N. Y.

Ohio

TINKHAM VEALE, II, has been appointed assistant to the president of the Ohio Crankshaft Co., Cleveland, Ohio, manufacturer of induction heating equipment and crankshafts for gasoline and Diesel engines. Mr. Veale has served as manufacturing and administrative head of the company's Tocco Division for the last three years.

JOHN E. ELLAS, who has been a salesman in the Detroit branch office of the Berger Mfg. Division, Republic Steel Corporation, Cleveland, Ohio, has been promoted to the position of manager of the Berger Kansas City branch office. His previous position will be filled by RICHARD E. LAUTZENHEISER.

PAUL E. LEES has been appointed vice-president in charge of sales of the Standard Tool Co., Cleveland, Ohio. Mr. Lees was formerly an executive of the Weldon Tool Co. of Cleveland. At the present time, he is serving as secretary of the Metal Cutting Tool Institute.

MOTCH & MERRYWEATHER MACHINERY CO., Cleveland, Ohio, recently opened a large modern building at 1350 E. 222nd St., Euclid, Ohio. The new plant covers 44,758 square feet, and has been designed throughout for the efficient handling and rebuilding of machine tools.

TINNERMAN PRODUCTS, INC., Cleveland, Ohio, has established a new division to expedite the development of the "Speed Grip" nut retainer, and has appointed CHARLES E. PEARSON coordinator of sales, production, and engineering of the new product.

CLEVELAND PNEUMATIC TOOL CO., Cleveland, Ohio, announces the election of the following vice-presidents: VERN R. DRUM, JOHN F. WALLACE, and E. W. CLEVELAND. Announcement has also been made of the appointment of RAY E. GREENOUGH as chief engineer of the company.

RONALD E. GRIFFITHS has been appointed assistant director of research of the American Steel & Wire Co., Cleveland, Ohio. Mr. Griffiths has been supervisor of the company's research laboratory for the last three years.

R. E. VALK has been made works manager of the Toledo plant of the National Supply Co., manufacturer of oil-well supplies, succeeding L. A. RINGMAN. Mr. Valk was formerly assistant works manager.

E. LOWE MCINTYRE, JR., has recently been appointed assistant sales manager in charge of new market developments for the Electric Products Co., Cleveland, Ohio.

WALTER F. BENNING has been appointed chief engineer of Willys-Overland Motors, Toledo, Ohio, and PHILIP C. JOHNSON has been made assistant chief engineer.

Pennsylvania

JESSOP STEEL CO., Washington. Pa., announces the following changes in production personnel: ARTHUR B. COOPER, assistant general superintendent, has become assistant to the vice-president in charge of operations; EDWIN C. THOMAS, JR., superintendent of the bar mill, has been appointed general superintendent; BENJAMIN H. BROWN has resumed his position of superintendent of the electric furnace department, having been engaged in consulting work during the past year; and JOSEPH W. STIER has joined the company as superintendent of scheduling, having formerly been employed by the Crucible Steel Co. of America.

CHRISTOPHER WILLIAMS & CO., INC., 923 Penn Ave., Pittsburgh, Pa., has recently been organized to act as engineers, specializing in the design and construction of rolling mill equipment. The company will also handle special conveyor and material-handling equipment and will act as manufacturers' representative. The president of the new company is CHRISTOPHER WILLIAMS, who was formerly associated with the Mesta Machine Co.

MELVIN C. HARRIS has resigned as vice-president in charge of production of the Allegheny Ludlum Steel Corporation, Pittsburgh, Pa. Mr. Harris has been with the corporation since 1915, becoming a vice-president in 1946. Pending the election of a successor, C. B. POLLOCK, production manager, will be in charge of production for the company.

EDMUND PFEIFER, who was on the Coatesville, Pa., sales staff of the Lukens Steel Co., has been made assistant district manager of sales at Boston, Mass. CHARLES H. PYLE will take over the territory in York and vicinity formerly handled by Mr. Pfeifer, making his headquarters in Coatesville.

BAKER BROTHERS, INC., Toledo, Ohio, has announced the appointment of MACHINERY ASSOCIATES, INC., Philadelphia, Pa., as exclusive dealer in the Philadelphia territory for the company's line of drilling and boring machines, keyseating and contour grinding machines, and special production machinery.

RICHARD W. BERG has been appointed district manager of the Pittsburgh office of the Torrington Co., Torrington, Conn. Mr. Berg joined the company in 1944 and has been district engineer in the Pittsburgh territory since 1945.

Wisconsin and Minnesota

A. C. FLAMME, sales manager of the TAYLOR MFG. CO., Milwaukee, Wis., and C. E. CHAVEZ, consulting engineer, announce the purchase of the Machinery Division of the company, which will be known in the future as the TAYLOR DYNAMOMETER & MACHINE CO. The offices of the new company are at 5108 W. Center St., Milwaukee, Wis. The company will continue the manufacture of sensitive drilling machines, static balancing machines, and hydraulic dynamometers.

IRVING S. LEVINSON has joined Ampco Metal, Inc., Milwaukee, Wis., as manager for the process industries. D. L. COLEMAN, field engineer in the Detroit district, has been named district manager of the company's Eastern-Texas Division, with headquarters at Houston.

Murray Corporation of America!

Selection of the right press for the specific job is made only after careful study and recommendations by the Bliss engineering staff, according to Murray's pressroom superintendent. It is this ever-expanding fund of knowledge, over 90 years in the making, that has made Bliss the first choice of stampers the world over. "Ranking next in importance," he says, "is Bliss' prompt service when parts have to be replaced or the presses serviced."

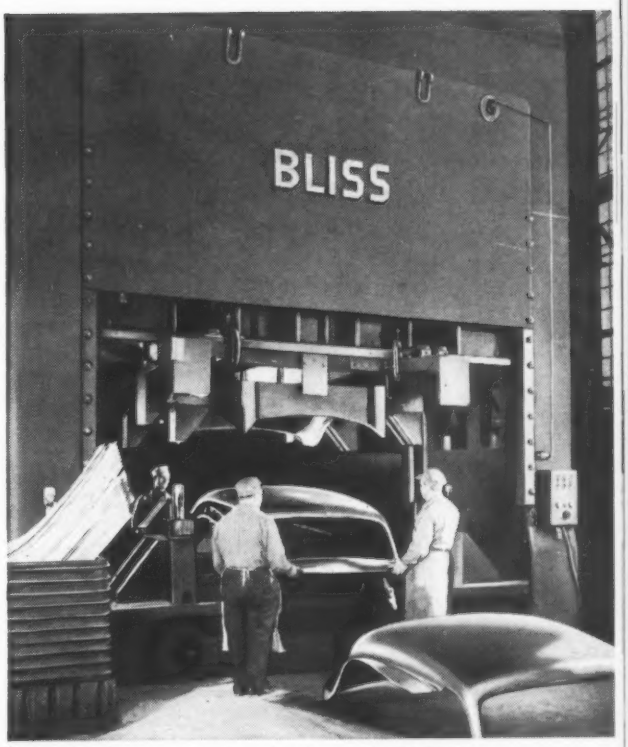
It's another reason why the pressed-metal industry knows that Bliss on a Press Is More Than a Name—*It's a Guarantee!*...why it pays *you* to put your press problem up to Bliss.

E. W. BLISS COMPANY

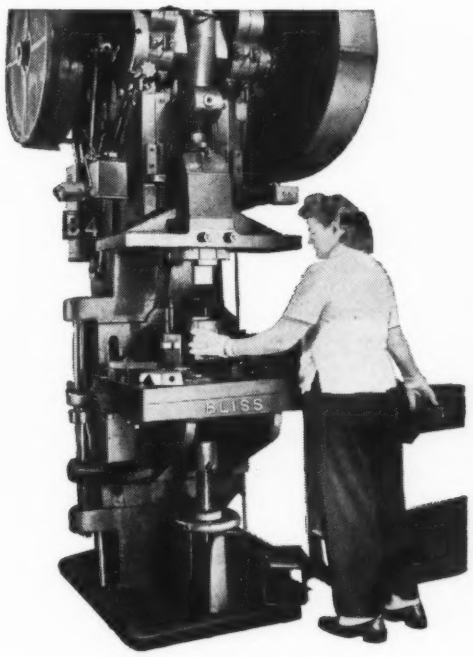
Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

General Office: Toledo, Ohio • General Sales Office: Detroit, Mich.

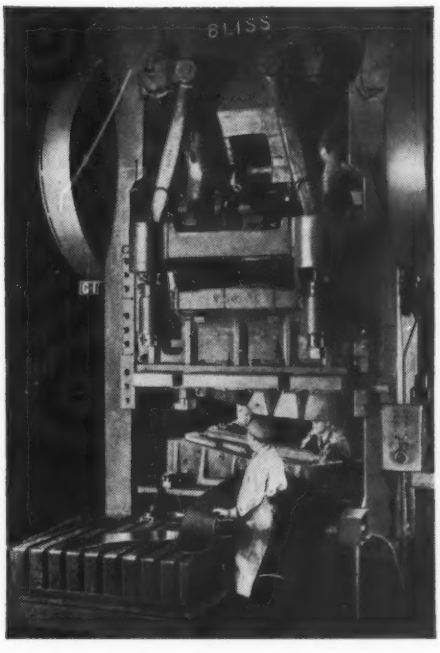
WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Michigan; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France.



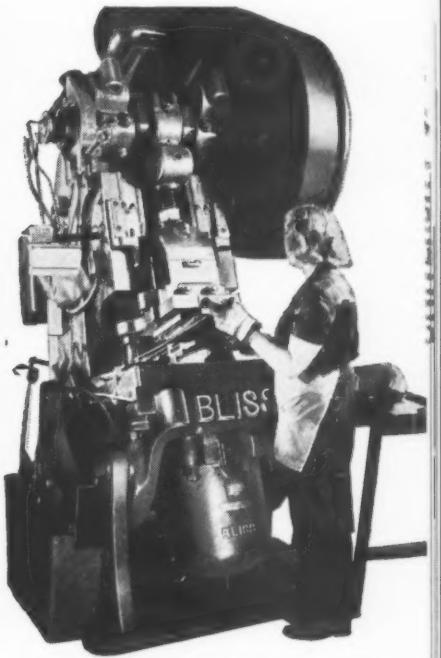
Trimming the turret top in a 4-point enclosed single action press with 160" wide bed. Press has 650 tons capacity. Operation is by electric push-button.



A Bliss adjustable bed press of 40 tons capacity is shown being used for general punch press work.



Deep pillars are drawn in Bliss No. 795½ Toggle Press. "The finest drawing press on the market," according to the pressroom superintendent.



Blanking salvaged scrap steel in No. 21½ Inclinable Press. Die cushion in bed permits shallow drawing.

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD

MARQUETTE • BLISS • CONSOLIDATED • TOLEDO • BLISS BUILT

Clifford J. Baxter, new general sales manager of the Gisholt Machine Co.

CLIFFORD J. BAXTER has been appointed general sales manager of the Gisholt Machine Co., Madison, Wis. Mr. Baxter has been district manager of the Chicago office for the last twenty years, and will be succeeded in that post by HOWARD V. MYERS. ERV. A. HUZA, formerly with the Philadelphia and Kansas City offices, will assist Mr. Myers.

DAVID V. UIHLEIN has acquired the BANNER MFG. CO., 4938 N. 29th St., Milwaukee 9, Wis., and will act in the capacity of executive director. ARTHUR KRANITZ remains in charge of production. The new organization plans to increase distribution and service on its line of resistance welders and brazers. J. R. G. HARRIS is handling the sale of Banner welders in the state of Wisconsin.

STANLEY M. HUNTER has been elected to the newly created position of executive vice-president of the American Hoist & Derrick Co., St. Paul 1, Minn. He has been with the company since 1936.

* * *

Meeting of the American Society for Quality Control

The American Society for Quality Control will take as the theme of its third annual convention "Controlled Quality Is Good Economy." The meeting is to be held in conjunction with the third New England Quality Control Conference on May 5 and 6 at the Copley-Plaza Hotel in Boston, Mass. Various sessions will deal with quality control engineering; management's quality problems; advanced techniques; and specific industry topics. Motion pictures and many exhibits will demonstrate the latest measuring and control devices.

New Books and Publications

ELEMENTS OF MECHANICAL VIBRATION. By C. R. Freberg and Emory N. Kemler. 227 pages, 6 by 9 inches. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $3.75.

The purpose of this book, which is now in its second edition, is to discuss in detail the more elementary phases of vibrations and reduce them to a form in which they can be applied to practical problems. The text has been kept as simple as possible, and many examples are given to illustrate the methods, and applications of the formulas developed. Two important new chapters have been added in this edition, one on sound and the other dealing with beams. The material is divided into ten chapters, discussed under the following headings: Vibrations without Damping; Damped Vibrations; Vibration of Systems with Several Degrees of Freedom; Vibration Isolation and Absorption; Equivalent Systems; Beams; Sound; The Mobility Method; and Mechanical and Electrical Models of Vibration Systems.

REPERTORIO DELLA METALLURGIA, MECCANICA, ELETTROTECNICA (Directory of Italian Manufacturers in the Mechanical, Electrotechnical, and Metallurgical Industries). 600 pages, 8 by 10 1/4 inches. Published by the Societa Editrice and distributed in the United States by E. L. Vidale, 125 W. Twelfth St., New York 11, N. Y. Price, $6, cloth-bound.

This directory contains the names and addresses of 9000 manufacturers in the metallurgical, mechanical, and electrotechnical industries of Italy, classified according to products and geographical location. Indexes to the 106 product classifications are provided in Italian, English, French, Spanish, and German. Each main product group is classified by a number, the corresponding numbers being printed on a thumb-index to provide a convenient means of locating the manufacturers of any particular product. The main classifications are subdivided, also by a numeral system, to facilitate finding the exact product desired.

DIAMOND TOOL PATENTS III—TRUING OF GRINDING WHEELS. By W. Jacobsohn. 87 pages, 7 1/4 by 9 1/2 inches. Published by the Industrial Diamond Information Bureau, Industrial Distributors (Sales) Ltd., 32-34 Holborn Viaduct, London E.C.1, England. Price, 12/6d.

About five hundred abstracts of British, American, and German diamond tool patents referring to the design, arrangement, or use of a particular truing device are presented in this publication, which is the third of a series. Owing to the large number of patents involved, the compilation is limited to the years 1916 to 1946. It is planned to bring out a book for the preceding years at a later date. The more recent patents are abstracted in the monthly issues of the "Bibliography of Industrial Diamond Applications," issued by the same Bureau.

CARBOLOY TOOL MANUAL. 190 pages, 5 1/2 by 8 inches; over 700 illustrations. Published by the Carboloy Company, Inc., Detroit, Mich. Price, 50 cents.

This manual presents technical data on the design, manufacture, and application of single-point carbide tools. It is divided into ten sections, covering the following specific subjects: Tool design; chip-breaker design; selection of grades and recommended speeds; brazing; tool grinding; chip-breaker grinding; application of tools; "trouble-shooting"; tool control and method selection; and inspection. The principles outlined can also be applied to multiple form tools. An index is included for ready reference. This manual is available without charge to supervisory personnel.

DIE-CASTING MACHINES. 52 pages, 5 1/2 by 8 1/4 inches. Published by the Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England. Price, 3/6d.

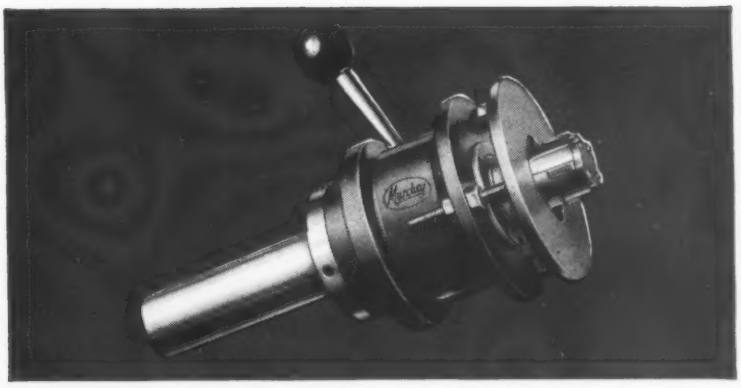
This booklet, which is a revised edition of No. 4b of MACHINERY's Yellow-Back Series, shows examples of the main types of modern die-casting machines and describes their construction and use. The machines discussed include plunger gooseneck, air-operated gooseneck, and cold-chamber types. A brief history of the development of the die-casting machine is given, and the general principles of operation are explained. The revised edition of this book has been almost entirely rewritten because of the changes that have taken place in die-casting equipment since the publication of the original edition.

THE STORY OF MAGNESIUM. By W. H. Gross. 260 pages, 5 by 7 1/2 inches. Published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Price, $1.50.

This is the first in a series of technical books written by outstanding metal engineers, the purpose of which is to provide young men and women who are not engineering graduates with the technical infor-

MURCHEY COLLAPSIBLE MACHINE TAPS FOR

Speed, accuracy and economy



For lowest cost per thread, use Murchey type "L" collapsible machine taps. Tap is used with handle on turret lathe and hand screw machines, and without handle on automatic screw machines and drill presses.

A simple but accurate adjustment at shank end of body expands or retracts the chasers to exact pitch diameter. This adjustment can be made without removing the tool from the machine. Chaser size adjustment at shank end facilitates adjustment and increases service life. Chasers are positively retracted.

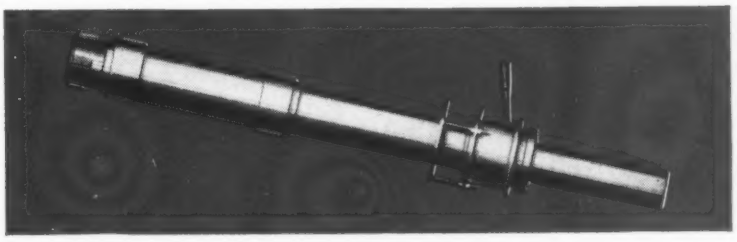
Chasers are easily replaced so that with one or more standby sets, the tool can be kept practically in continuous operation.

The type "L" tap is highly flexible. Body and nose piece are separate. Two tools with separate nose pieces provide a threading range of 15 basic sizes from 1⅛" to 6" in diameter. The nose piece is detachable so that several sizes can be used on each tool body. The sealed nose excludes chips and dirt.

● SPECIALS OF ALL TYPES

Special collapsible taps of various lengths having one or more pilots and other features such as reamers and boring tools can be provided for any special requirement.

Write for catalog



Since 1904

Lower cost per thread . . .

WITH MURCHEY TOOLS

MURCHEY MACHINE & TOOL CO.

MURCHEY

DAYTON 1, OHIO, U. S. A.

SUBSIDIARY OF THE SHEFFIELD CORP.

Manufacturers of collapsible taps, self-opening die heads (tangent and radial chaser types) and special threading tools

mation needed to understand the science of metals as it is applied in industrial production. The material should be suitable for use as a basis for lectures, as supplementary reading in plant courses, and for self-educational purposes.

PATENT LAW. By Chester H. Biesterfeld. 267 pages, 6 by 9 inches. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $4.

The purpose of this work, of which this is a second edition, is to provide a simple, clear treatment of the basic principles of patent law, illustrated by decisions of the courts. As some change has been made in the patent laws in the last five years and a considerable number of important court decisions have been made, a revision of the text seemed advisable to bring the material up to date. While the text has been written so as to be clearly understood by students, the material should also be of value to patent attorneys, inventors, chemists, and engineers.

BIBLIOGRAPHY ON X-RAY STRESS ANALYSIS (With Subject Index). By Herbert R. Insenburger. 17 mimeographed sheets, 8 1/2 by 11 inches, containing 240 references. Published by the St. John X-Ray Laboratory, Califon, N. J. Price, $3.

PHYSICAL PROPERTIES AS INFLUENCED BY "AS-QUENCHED" HARDNESS. Published by the Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y., as Report SP-53. Price, $1 to S A E members; $2 to non-members.

ALUMINUM-ALLOY CASTINGS. By Floyd A. Lewis. 63 pages, 8 1/2 by 10 3/4 inches. Published by the Aluminum Association, 420 Lexington Ave., New York 17, N. Y. Price, 50 cents.

* * *

Mobile X-Ray Unit for Checking Factory Employes

The American Brake Shoe Co. of New York City has purchased a $20,000 bus equipped with a General Electric photo-roentgen unit especially designed to provide chest X-ray examinations for its 10,000 employes scattered through the fifty-seven plants of the company in the United States and Canada. For the last six years, the company had used a station wagon equipped with an X-ray unit, but with the new bus it will be possible to make a complete survey of all its employes once a year. The policy of routine periodic chest X-rays was adopted by the American Brake Shoe Co. in 1932 as part of its health-protection program.

Obituaries

Willard Henry Dow

Dr. Willard H. Dow, president and chairman of the board of the Dow Chemical Co., Midland, Mich., was killed in a plane crash on March 31 near London, Ontario, Canada, while on his way to attend the fiftieth anniversary celebration of the Massachusetts Institute of Technology. His son is a student at that university.

Dr. Dow was born in Midland, Mich., on January 4, 1897. His early education was obtained in the Midland schools, after which he attended the University of Michigan, graduating in 1919 with the degree of bachelor of science in chemical engineering. He had also received the honorary degrees of doctor of science from the Michigan College of Mining and Technology, and doctor of engineering from the University of Michigan and the Illinois Institute of Technology.

He started his career with the Dow Chemical Co. in 1914, working one year there before he attended the University of Michigan. Upon graduating from the university in 1919, he resumed work with the company and was made a director in 1922. In 1930 he became president and general manager, and in 1941 was made chairman of the board. At the time of his death, Dr. Dow filled the duties of president, general manager, and chairman of the board, all three of these offices having been consolidated in that of the president when the company was reorganized in 1947.

Dr. Dow was an outstanding figure in the chemical industry, and was active in many chemical associations, as well as in other scientific and fraternal organizations. He was honored by the American Institute of Chemists in 1944 with the award of the Gold Medal, and by the American Society for Metals in 1948 with the Medal for the Advancement of Research, as well as with other medals and awards.

Dr. Dow's wife was also killed in the plane crash. He is survived by his son, Herbert Henry Dow, and a daughter, Mrs. Macauley Whiting, of Midland.

Benjamin F. Waterman

Benjamin F. Waterman, who was employed by the Brown & Sharpe Mfg. Co., Providence, R. I., for more than fifty years, died at his home in Providence on March 22 at the age of sixty-nine years. He joined the company in 1895, and in 1900 completed his apprenticeship as a machinist. Mr. Waterman filled various important positions, including foreman of the gear department, designer of gears and gear-cutting machinery, and head of the mechanical planning department, the position he held at the time of his retirement in May, 1947. He served as president of the American Gear Manufacturers Associati n from 1930 to 1932, and in 1942 was elected to honorary life membership, thereby becoming the third member of the Association to receive this honor.

* * *

Delta Welding Machines Demonstrated

To acquaint customers and dealers on the West Coast with the capabilities of its new welding machines, the Delta Mfg. Division of the Rockwell Mfg. Co., Milwaukee, Wis., recently held a series of six "welding clinics" or demonstrations of the Delta spot-welder, arc-welder, and "Dual-Weld" combination unit. At these demonstrations, which were held in Los Angeles, San Francisco, Portland, Seattle, and Vancouver, the machines were shown in operation, and those attending were invited to ask technical questions, operate the machines, and weld any samples of work they wanted to have done.

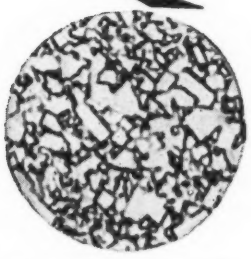
* * *

Award for Achievement in Metallurgy

Announcement has been made that the Penn State Chapter of the American Society for Metals, located at State College, Pa., will make an annual award to a Penn State graduate who, in the opinion of the awarding committee, has attained eminence in the metallurgical profession. The award is to be known as the David Ford McFarland Award in honor of Dr. McFarland, whose name has been longest and most closely associated with metallurgy at Pennsylvania State College.

Better Performance ... because of Better Structure*

It takes a hard, strong, sound tool material to remove 4,500 cubic inches of metal from five of these semi-steel cast-iron cylinder liners before regrinding—and then to repeat the performance after each resharpening, over the entire life of the tool.



* Consistent soundness and uniformity of structure characterize all Kennametal compositions, as illustrated in the micrograph above (1500 times enlargement). Note absence of large grains, and virtual freedom from porosity.

All Kennametal compositions are much harder than the hardest tool steel, and the uniformity of hardness and strength of each grade comes from a consistently sound physical structure which is produced by distinctive processing, and precise, scientific methods of control.

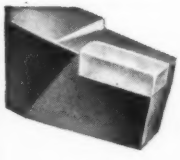
The proof of the pudding is in the eating—service results prove that a carbide which gives superior service is that having uniform grain structure, and therefore consistently maintained hardness, strength, and wear-resistance. That's Kennametal.

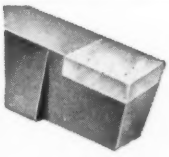
Equally important in cutting machining costs are Kennametal developments in mechanically-held tooling which further extend the profitable use and low-cost maintenance of carbide tooling.

Kennametal tooling is completely-proved—can save money on 90% of your routine and unusual jobs. Ask our district engineer to demonstrate.

KENNAMETAL Inc.
LATROBE, PA.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTION


STYLE BL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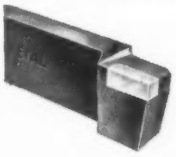
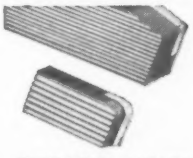
STYLE FL


STYLE GL


KENNAMATIC STYLE 12SK


SERRATED MILLING CUTTER BLADES

Coming Events

MAY 5-6—Third annual convention of the AMERICAN SOCIETY FOR QUALITY CONTROL, in conjunction with the third New England Quality Control Conference at the Copley-Plaza Hotel in Boston, Mass. Information on registration and reservations can be obtained from Dorothy M. Lewis, 28 Haskell Ave., Revere 51, Mass.

MAY 10-13 — Eighteenth annual NATIONAL PACKAGING EXPOSITION in the Public Auditorium, Atlantic City, N. J. Sponsored by the American Management Association, 330 W. 42nd St., New York 18, N. Y.

MAY 19-21—Spring meeting of the SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS at the Hotel Statler, Detroit, Mich. For further information, address the Society, P.O. Box 168, Cambridge 39, Mass.

MAY 26-27—Annual meeting of the SOCIETY OF THE PLASTICS INDUSTRY at the Edgewater Beach Hotel, Chicago, Ill. Headquarters of the Society, 295 Madison Ave., New York 17, N. Y.

JUNE 4-11—First INTERNATIONAL INVENTORS' EXPOSITION, sponsored by the AMERICAN INVENTORS ASSOCIATION, at the Grand Central Palace, New York City. Secretary, Serge Tray, 2 W. 46th St., New York City.

JUNE 27-30—Thirty-Sixth Annual Convention of the AMERICAN ELECTROPLATERS SOCIETY in Milwaukee, Wis., with headquarters at the Schroeder Hotel. For further information, address the Society at 473 York Road, Jenkintown, Pa.

JUNE 27-JULY 1—Annual meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS at the Hotel Chalfonte-Haddon Hall, Atlantic City, N. J. Headquarters of the Society, 1916 Race St., Philadelphia 3, Pa.

SEPTEMBER 26-28—NATIONAL ELECTRONICS CONFERENCE at the Edgewater Beach Hotel in Chicago, Ill. Sponsored by the Illinois Institute of Technology, Chicago 16, Ill.

OCTOBER 10-14 — National meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS in San Francisco, Calif.; headquarters, Fairmont Hotel. Headquarters of the Society, 1916 Race St., Philadelphia 3, Pa.

OCTOBER 17-21 — METAL CONGRESS and EXPOSITION to be held in connection with the thirty-first annual meeting of the AMERICAN SOCIETY FOR METALS at the Public Auditorium in Cleveland, Ohio. National secretary, W. H. Eisenman, 7301 Euclid Ave., Cleveland 3, Ohio.

Hole-Punching Die that Automatically Centers Strip Stock of Varying Width

A die designed with guides that automatically center strip stock during punching, notching, or piercing operations has been employed by the Clarendon Pressing & Welding Co., Ltd., of Coventry, England, for jobs on which the nominal width of the stock varied as much as plus or minus 1/8 inch. This die is shown in the accompanying illustration.

The base or die-block *A* is a semi-steel casting that has been bored or machined to take a hardened steel die *B*. As is usual with a standard die-block, dies for punching different sizes of holes can be interchanged in this bore, the die being held by means of a set-screw.

The slide *C* is of hardened steel, and is set into a machined recess in the die-block; the top of the slide is level with the top of the die and the die-block. The recess allows the slide a movement of approximately 1/2 inch. The hardened studs *D* are fixed into the slide equidistant from the center line. Two hardened steel locating plates *E* pivot on shouldered studs, and each plate has a slot at 30 degrees to the center line of the die-block in which studs *D* are a sliding fit. In the lower view of the illustration, the left-hand locating plate is shown swung in for locating the strip when it is of minimum width, while the right-hand plate is positioned for the maximum width of strip.

With this arrangement, when the locating plate on one side is opened or closed, the slide is moved forward or backward, which causes the locating plate on the other side to be moved correspondingly. The faces of plates *E* are so shaped that they locate the work at a point nearest the piercing punch. When the nominal width of the strip is changed, another pair of locating plates must be used.

A mild steel plate *G* is fixed to the die-block with two small screws. This plate has a hole to clear the small turned end of the slide. A light spring *H* is put over this end, which is threaded and fitted with a spring retaining nut and a washer.

In operation, the spring will return the slide to the rear position, so that on withdrawing the strip stock from the tool, the locating plates will assume a closed position. A stripper plate (not shown) is fitted to the die-block at a suitable height so that it serves also to retain the locating plates and slide in their correct positions.

An end-locating plate to suit the job being handled may be fixed to the die-block independently of any of the other parts. In this connection, it is an advantage to make the small turned end of the slide a separate piece and rivet it to the under side of the slide. This will bring that part of the slide lower, thus leaving the surface clear and enabling end locations to be made to any length.

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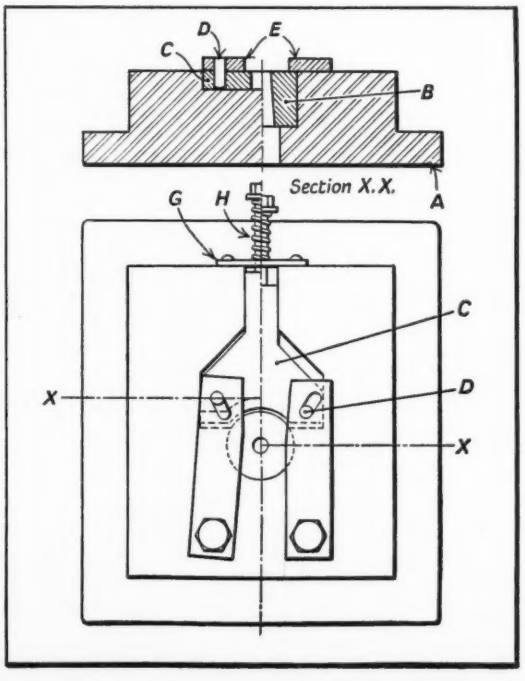
The Rouge plant of the Ford Motor Co. maintains a 110-acre parking lot for 25,000 workers' cars; 26 miles of roads; 105 miles of railroad tracks; and 19 locomotives to pull the 1100 railroad cars needed to keep the production stream flowing.



Sectional and plan views of a die designed with locating plates (E) that automatically center strip stock during punching, notching, or piercing operations. In the plan view, the left-hand plate is shown swung in for locating the strip when it is of minimum width, while the right-hand plate is positioned for maximum width of strip